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**Topography Experiment (TOPEX)
Software Document Series**

Volume 4

TOPEX SDR Processing

October 1998

Jeffrey Lee, Dennis Lockwood

*TOPEX Contact:
David W. Hancock III*

July 2003

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*Jeffrey Lee, Dennis Lockwood
Raytheon ITSS, Wallops Island, VA*

*TOPEX Contact:
David W. Hancock III
NASA GSFC Wallops Flight Facility, Wallops Island, VA*

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

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About the Series

The TOPEX Radar Altimeter Technical Memorandum Series is a collection of performance assessment documents produced by the NASA Goddard Space Flight Center Wallops Flight Facility over a period starting before the TOPEX launch in 1992 and continuing over greater than the 10 year TOPEX lifetime. Because of the mission's success over this long period and because the data are being used internationally to redefine many aspects of ocean knowledge, it is important to make a permanent record of the TOPEX radar altimeter performance assessments which were originally provided to the TOPEX project in a series of internal reports over the life of the mission. The original reports are being printed in this series without change in order to make the information more publicly available as the original investigators become less available to explain the altimeter operation and details of the various data anomalies that have been resolved.

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Foreword

This document is a compendium of the WFF TOPEX Software Development Team's knowledge regarding Sensor Data Record (SDR) Processing. It includes many elements of a Requirements Document, a Software Specification Document, a Software Design Document, and a User's Manual. In the more technical sections, this document assumes the reader is familiar with TOPEX and Instrument files.

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Section 1

Introduction

1.1 Purpose

This document provides a detailed description of TOPEX Sensor Data Record (SDR) Processing at NASA Goddard Space Flight Center's Wallops Flight Facility (WFF). SDR Processing is work-in-progress and this document will be updated to reflect changes in the documented software or procedures.

1.2 Scope

This document is Volume 4 in a series of publications generated by the TOPEX Software Development Team (SWDT) at WFF. Volume 1 is an overview of the project and its processes. Volume 2 documents pre-launch Radar Altimeter System Evaluator (RASE) processing. Volumes 3 and 5 document Altimeter Instrument File (AIF) and Geophysical Data Record (GDR) processing, respectively. Volume 6 covers Special Processing which does not fall into any of the other categories. The series is an attempt to document SWDT software and procedures used in support of TOPEX at WFF.

1.3 Organization of Document

Section 2 lists other documents related to this document. Section 3 describes Sensor Data Record files. Section 4 describes Special Processing. Section 5 details the components of SDR processing. Appendix A contains samples of SDR Standard Products. Appendix B lists programs and software used and developed. Appendix C describes the contents of SDR output files and databases. Appendix D has plots of reference values used in SDR Processing. Appendix E contains significant documents and memos related to SDR Processing.

Section 2

Related Documentation

2.1 Publications

- *TOPEX/POSEIDON Joint Verification Plan*, June 15, 1992, JPL92-9.
- *TOPEX Mission Radar Altimeter Engineering Support Plan*, May 1992, NASA GSFC WFF.
- *TOPEX Project Radar Altimeter Development Requirements and Specifications*, August 1988, NASA GSFC WFF 672-85-004.
- *TOPEX Ground System Algorithm Specification Document*, September 1990, JPL D-7075 (Rev. A), TOPEX 633-708.
- *TOPEX Ground System Software Interface Specification, Volume 2: Design (SIS-2) Altimeter Sensor Data Record (SDR) - ALT SDR Data*, May 15, 1992, JPL D-8591 (Rev. B), TOPEX 633-751-23-001, Rev. B.
- *Interface Control Document between the TOPEX Ground System and the Goddard Space Flight Center/Wallops Flight Facility Oceans Laboratory*, (Rev. 2.0), July 1990, TOPEX 633-712J.
- *Wallops Flight Facility TOPEX Project Software Products Specification for Engineering Assessment Software*, January 1991.
- *Applied Physics Laboratory, TOPEX Radar Altimeter System Specification*, APL Document 7301-9028.
- Hancock, D. W., III, 1989, *Studies in Support of The NASA Ocean Topography Experiment (Report 1)*, NASA TM-100766.
- Zieger, Alfred R., David W. Hancock, III, George S. Hayne, and Craig L. Purdy, June 1991, *NASA Radar Altimeter for The TOPEX/POSEIDON Project*, Proceedings of The IEEE, Vol. 79, No. 6, pp. 810-826.
- Marth, P. C., J. R. Jensen, C.C.Kilgus, J. A. Perschy, and J. L. MacArthur of The Johns Hopkins University Applied Physics Laboratory; D. W. Hancock, III, G. S. Hayne, C. L. Purdy, and L. C. Rossi of NASA GSFC WFF; and C.J. Koblinsky of NASA GSFC, *Pre-Launch Performance of the NASA TOPEX/POSEIDON Altimeter*, IEEE Transactions on Geoscience and Remote Sensing, 31(2), pp. 315-332, 1993.
- Hancock, D. W., III, R. L. Brooks and H. A. Goldberg, June 1992, *Performance Parameters for The TOPEX Radar Altimeter from Bench Testing through Spacecraft Thermal Vacuum Testing*, NASA GSFC WFF.
- Hayne, G.S., March 1993, *Estimating Ku Range Noise*, WFF TOPEX Informal memorandum.

- Hayne, G.S. September 1993, *Current Status of Work on σ^0 Blooms*, WFF TOPEX Informal Memorandum.
- Hayne, G.S., D.W. Hancock III, C.L. Purdy, and P.S. Callahan, 1994, *The Corrections for Significant Waveheight and Attitude Effects in the TOPEX Radar Altimeter*. Draft submitted to Journal of Geophysical Research.

For completeness, selected documents and memos are included in Appendix E-Attachments.

Section 3

Sensor Data Record Files

3.1 Definition

Sensor Data Record (SDR) files are created from Altimeter Instrument Files (AIFs) by the TOPEX Ground System (TGS) at the Jet Propulsion Laboratory (JPL). SDR files provide WFF with the most immediate look at the processed altimeter data and merged navigational data. The flow of altimeter data is depicted in Figure 3-1, where emphasis is placed on the SDR data flow.

The TOPEX Ground System extracts altimeter science and engineering minor frames from the spacecraft telemetry. Common frames are merged and time-sorted to create AIFs. AIFs and the earth-location data are processed using Telemetry and Science-level algorithms to create once-per-pass (about 56 minutes) SDR files. The SDR files contain science and engineering records corresponding to the AIF science and engineering files. The processed SDRs are placed in temporary storage. At the end of a 10-day Cycle, the SDR pass files are copied to tape.

For a complete description of the SDR formats, see TOPEX Ground System Software Interface Specification (SIS-2) Altimeter Sensor Data Record (SDR) - Alt SDR Data.

3.2 Distribution

Individual SDR pass files are made accessible to WFF via the NASA Science Internet (NSI) using FTP protocols. SDR per-cycle tapes are mailed to SDR data subscribers by JPL. The WFF SWDT receives these tapes and archives them for later use. The SWDT redistributes copies of the SDR tapes to external users if so requested.

3.3 Storage

A single SDR pass file requires approximately 5.5 megabytes of disk storage. A full cycle of SDR pass files consumes approximately 1.5 gigabytes of disk space. WFF generally keeps no SDRs in the working area. Every SDR cycle tape generated has been archived and is available for use at WFF.

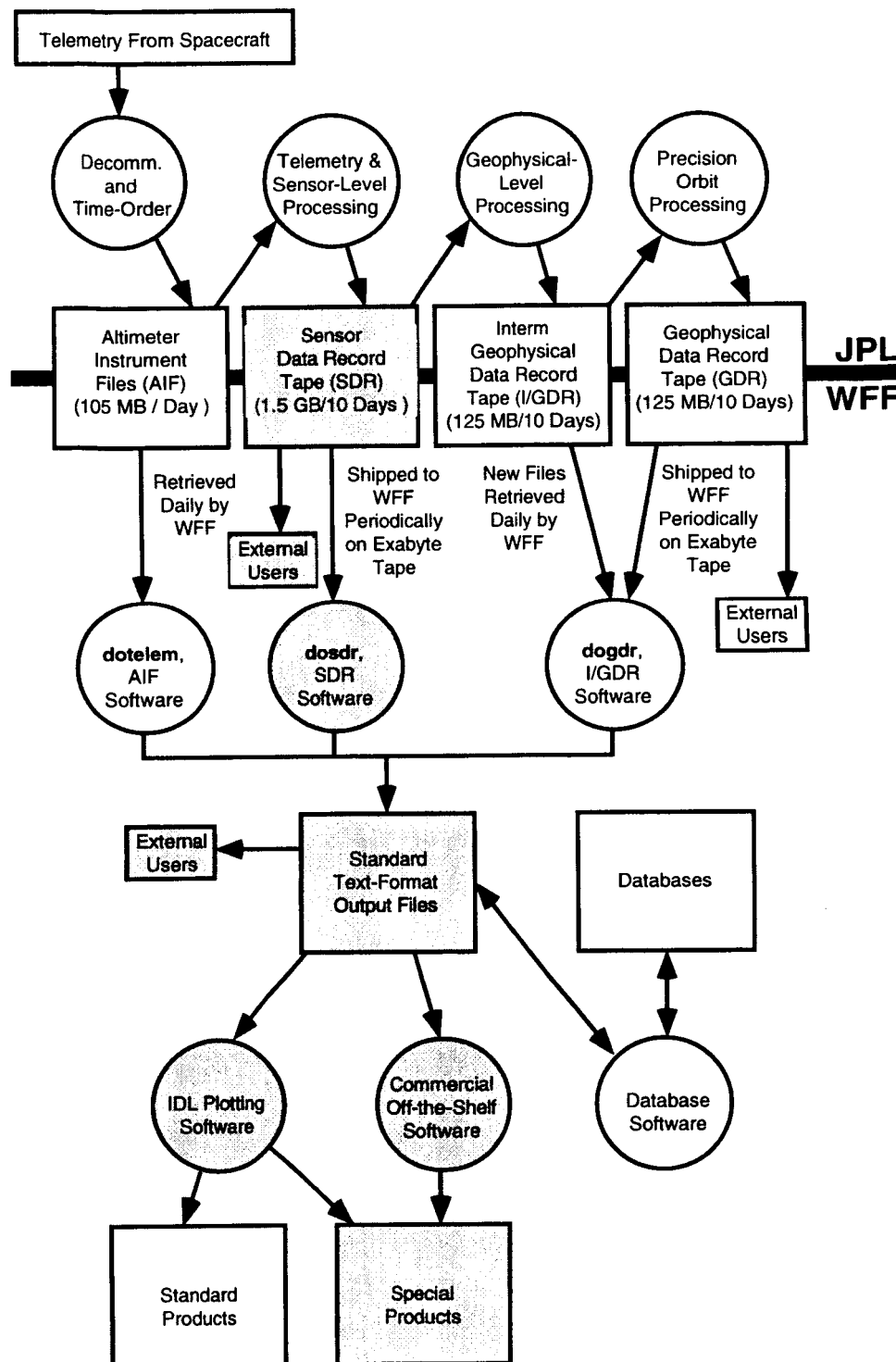


Figure 3-1 TOPEX ALT Dataflow (SDR Emphasized)

SDR Special Processing

All SDR processing is Special Processing; special processing is defined as that which is not done on a regular chronological basis. **dosdr** is the FORTRAN software used to process SDR data. Many **dosdr** products can be used for special processing along with commercial-off-the-shelf (COTS) software. Special processing can also be performed using IDL software. There are many other forms of special processing performed on TOPEX SDR data; this section explains the general methods by which special processing is performed.

4.1 dosdr Special Processing

In general, SDR Special Processing is performed by using **dosdr** to create one or more special output files. The resulting files are then copied to a user for analysis, or one of the TOPEX SWDT members uses custom IDL or COTS software to create the desired product. Any **dosdr** option can be used for special processing, but one of the more common options is Waveform Averages.

4.2 IDL Special Processing

Another way to perform special processing is to create customized IDL plot programs. This has been done on occasion to create particular plots for papers and/or presentations. Many of the standard IDL programs can also be run using non-standard arguments to print according to custom specifications.

4.3 Database Special Processing

Relatively little database special processing is performed, since an SDR database is not being actively maintained but we are keeping a waveform monitoring "**wfmon**" database.

4.4 Examples of Special Processing

Two examples of special processing include creating an SDR science pass plot, and then using StatView to explore areas of interest in greater detail.

4.4.1 Creating an SDR Pass Plot

To create a quick-look plot of SDR science parameters, **dosdr** is run to create a file containing ten-second science averages. The resulting file is processed by the IDL program **topexsdr** to create an SDR pass plot. A sample SDR pass plot is shown in Figure A-1.

4.4.2 Creating a Detailed Science Plot

If science data needs to be explored in greater detail, **dosdr** is run again to create science data averages over a user-specified time interval. The resulting file is processed by the IDL program, **sciavg**, to plot selected science averages. Figure A-2 is an example of the SDR science average plots.

4.4.3 Creating a Detailed Engineering Plot

If engineering data needs to be explored in greater detail, **dosdr** is run again to create engineering data averages over a user-specified time interval. The resulting file is processed by the IDL program, **scieng**, to plot selected engineering averages. Figure A-3 is an example of the SDR engineering average plots.

Section 5

Components of SDR Processing

Figure 5-1 depicts the flow of SDR data during processing. There are four major components of AIF processing software: **dosdr**, the FORTRAN program which performs initial data processing; SDR databases, which handle data storage, retrieval, and secondary processing; IDL programs, which handle most of the plotting duties; and UNIX scripts, which automate much of the processing. These components comprise a system that is sufficiently automated to handle standard processing tasks and yet flexible enough to assist in highly-detailed engineering assessment investigations.

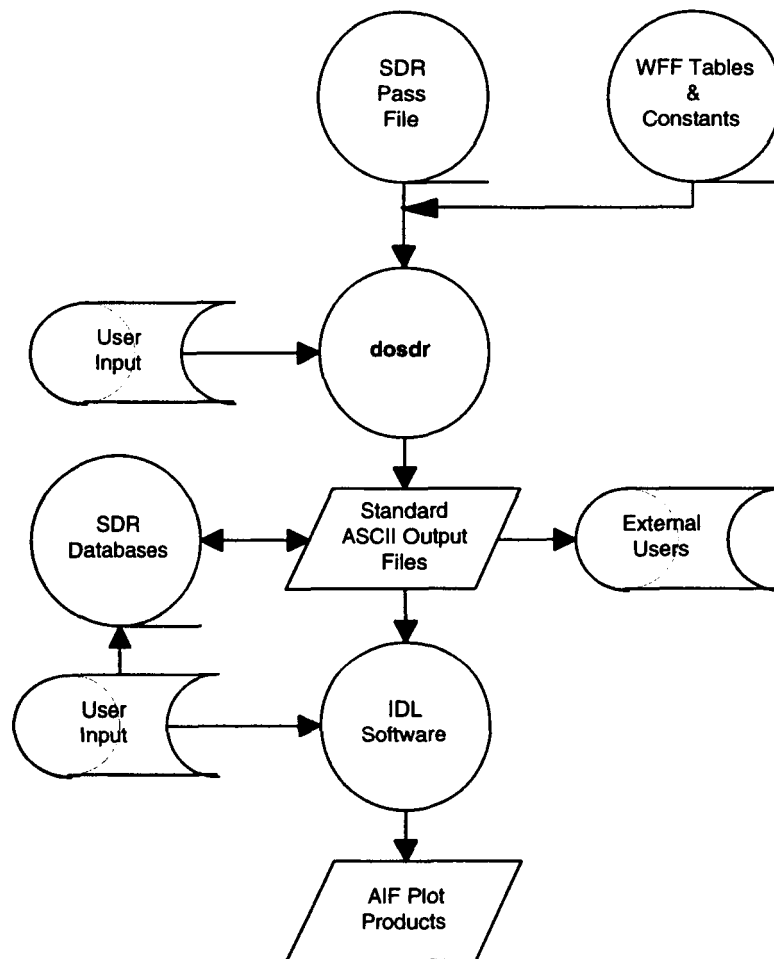


Figure 5-1 SDR Processing Dataflow

5.1 dosdr

dosdr is the FORTRAN program responsible for all SDR data processing. It is highly interactive, allowing the user to choose what process to run and to specify customized parameters for the chosen process. Figure 5-2 depicts the **dosdr** startup screen. **dosdr** has three main components: the Initialization Module, the User Input Module, and the Data Processing Loop. Figure 5-3 diagrams the highest-level **dosdr** processing.

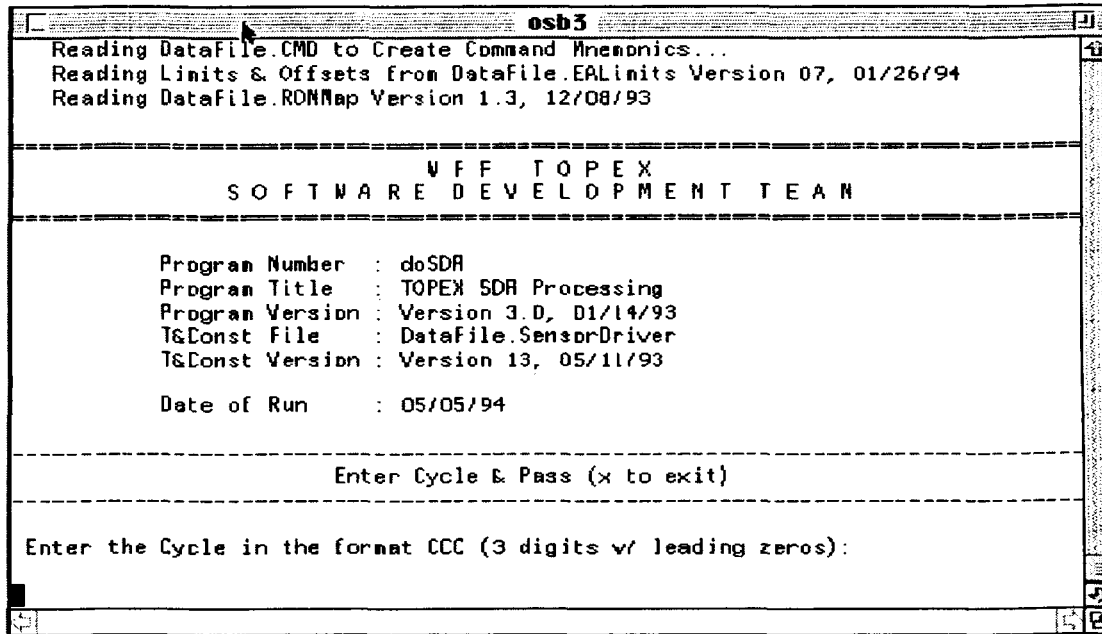


Figure 5-2 **dosdr** Startup Screen

The software currently runs on **osb3**, a Sun Microsystems SparcStation 10 UNIX workstation. However, since **dosdr** was originally coded on the Apple Macintosh platform, and then ported to the Sun environment, the code has been designed to be highly portable.

5.1.1 **dosdr** Initialization Module

Upon startup, **dosdr** initializes several data structures needed to decode and process data. There are basically three types of data structures used: byte maps, constants tables, and look-up tables. Byte maps are used for easily referencing which bytes in the raw SDR data correspond to which converted engineering units. Constants tables contain constants used by various processing routines, and are initialized by reading values from appropriate external files. Lookup tables are used for such things as integer-to-mnemonic conversion, memory maps, and labeling. Table 5-1 lists the data structures initialized by **dosdr**.

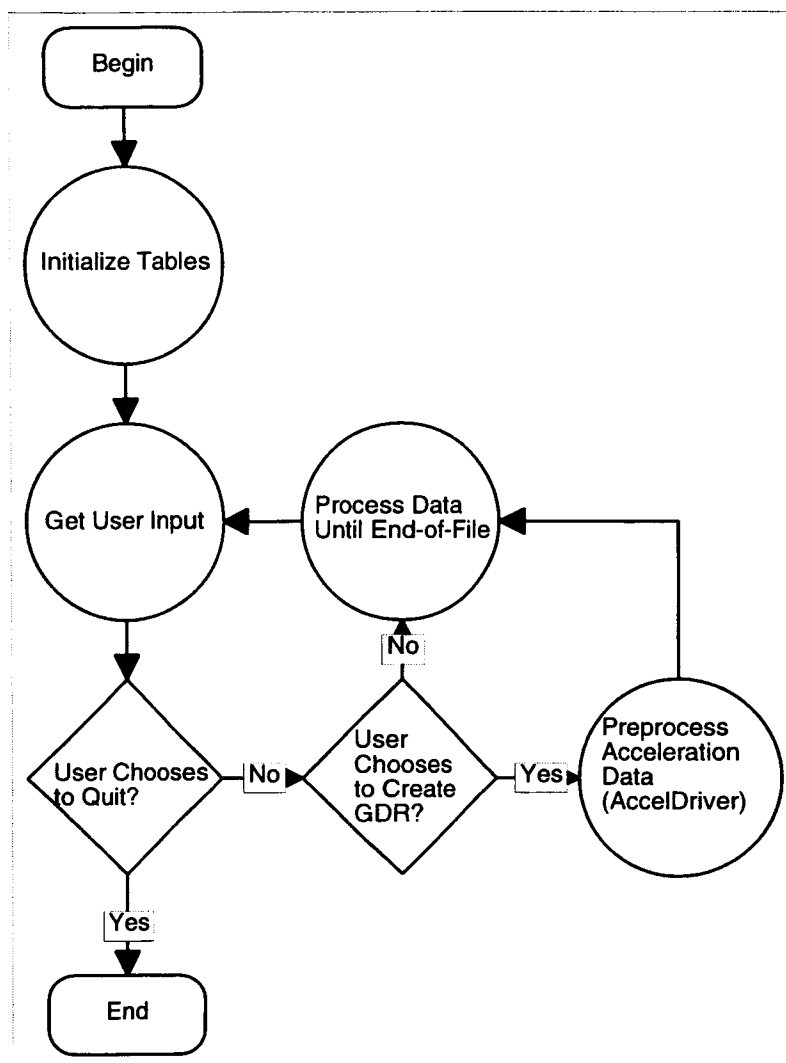


Figure 5-3 dosdr Main Processing

5.1.2 dosdr User Input

`dosdr` is designed to be highly interactive and offer the user a variety of processing options. The user must enter the Cycle and Pass of the file to process and select a processing method; the processing selection screen is shown in Figure 5-4. The user may optionally set custom parameters such as averaging time, mode selection, and parameters to report. Defaults are provided in all cases. Table 5-2 lists processing type, options, and defaults. Time selection is available as an option for all processes.

Table 5-1 Data Structures Initialized by dosdr

Structure	Description
SDREngDef	Byte map of data contained in the SDR engineering record.
SDRSciDef	Byte map of data contained in the SDR science record.
TelemConstDef	Constants table used by AIF processing. Read from Data-File.TelemDriver.
SensorConstDef	Constants table used for SDR creation. Read from DataFile.SensorDriver.
CMDTabnleDef	ASCII codes used for converting integer commands to mnemonics. Read from DataFile.CMD.
EngLabel	Table of labels used for identifying engineering parameters.
EALimitsDef	Constants table used for Engineering Assessment. This contains reference values for CAL and Waveform data, as well as other engineering Assessment constants. Read from DataFile.EALimits.
IGDRDef	Byte map of data contained in the I/GDR data record.

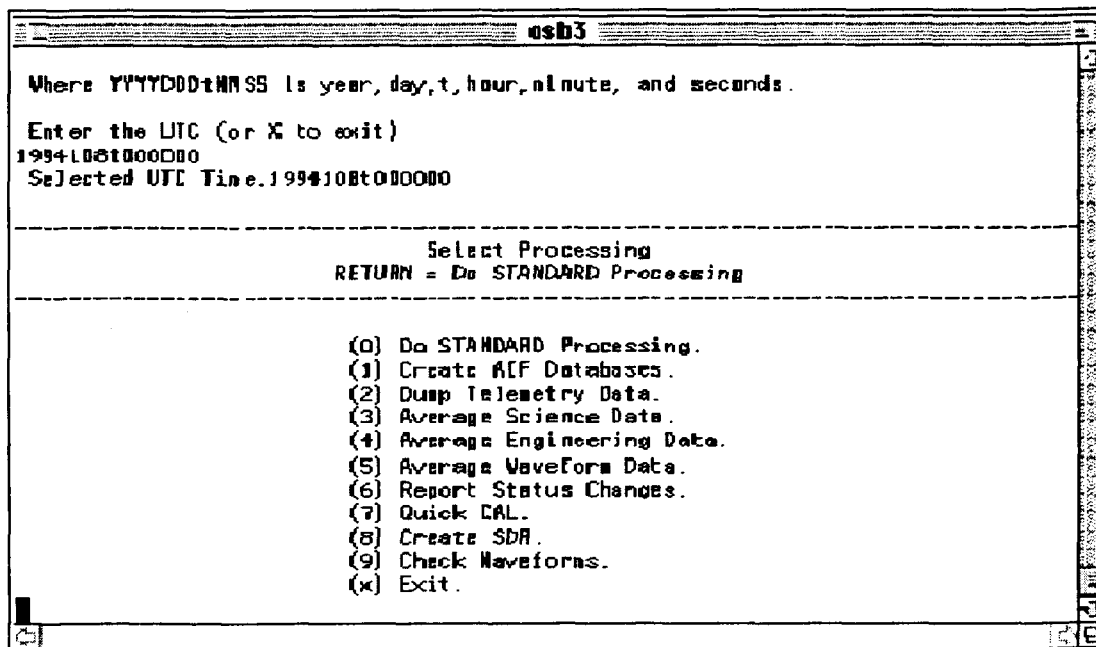


Figure 5-4 dosdr Primary User Input Screen

Table 5-2 dosdr Processing Options

Process	Options	Defaults
STANDARD Processing\ (default process)	none	Create SDR Databases 10 sec Science Averages
Create SDR Databases	none	1 Minute Science Averages 1 Hour Engineering Averages CAL Mode Processing Check Commands Check Science Check Engineering
Dump SDR Data	Dump What Data Dump Full Rate Time Selection	Science and Engineering No Process All Data
Average Science Data	Seconds to Average What Modes Time Selection	10 seconds Track Modes Process All Data
Average Engineering Data	Seconds to Average What Modes Time Selection	60 seconds All Modes Process All Data
Average Waveform Data	Seconds to Average What Modes Time Selection	1 second All Modes Process All Data
Report Status Changes	Check What Data Check What Params Time Selection	Science and Engineering All Parameters Process All Data
QuickCAL	none	No
Create IGDR	Debug Algorithms	No

5.1.3 dosdr Processing Loop

After a user has chosen which process(es) to run and which options to use, **dosdr** runs in a processing loop until either all data have been read from both science and engineering files or a time is detected that is later than a user-specified stop time. **dosdr** branches off the main loop to run those processes that the user has specified.

The exception to this is the I/GDR creation process. It is complicated by Algorithm S1015 Height Acceleration Computation, which uses a three-frame scheme to determine height acceleration corrections. The I/GDR creation process is detailed in Section 5.1.15.

5.1.4 dosdr Record Validation

dosdr uses the appropriate T4108 Preliminary Flags to check the validity of SDR Science and Engineering records. T4108 sets FlgEC4108 if it detects a bad checksum in the engineering record and sets FlgSC4108 if it detects a bad checksum in the science record. T4108 also sets FlgER4108 if it detects a reset. If any of these flags are set, the record is considered non-valid and is deleted.

5.1.5 dosdr Science Unit Conversion

SDR Science data must be converted from raw SDR data into engineering units to be used during processing. The process that performs this conversion is **SDRSciConv**. Most parameters in the SDR Science data record are converted into meaningful engineering units for processing.

5.1.6 dosdr Engineering Unit Conversion

SDR Engineering data must be converted from raw SDR data into engineering units in order to be used during processing. The process that performs this conversion is **SDREngConv**. Most parameters in the SDR Engineering data record are converted into meaningful engineering units.

5.1.7 dosdr Standard Processing

Standard Processing is the default process for **dosdr**. Standard Processing calls several of the other processing modules with specific parameters. Table 5-3 lists the modules called and the corresponding parameters supplied. See Appendix C for output file formats.

Table 5-3 Standard Processing Modules & Parameters

Module	Parameters
Average Science	10 Second Averages, Track Modes Only
Average Engineering	1 Hour Averages, All Modes
Check Status	Check Science & Engineering, Check Standard Parameters
QuickCAL	- no options available -

5.1.8 dosdr Create SDR Databases

Create SDR Databases calls several of the other processing modules with specific parameters. Table 5-4 lists the modules called and the corresponding parameters supplied. See Appendix C for output file formats.

Table 5-4 Create SDR Databases Modules & Parameters

Module	Parameters
Average Science	60 Second Averages, Track Modes Only
Average Engineering	1 Hour Averages, All Modes
Check Status	Check Science & Engineering, Check Standard Parameters
QuickCAL	- no options available -

5.1.9 dosdr Dump SDR

The telemetry dumping routine, **dumpsdr**, simply dumps all decoded parameters in each science and/or engineering record to output files. The user may specify if all data are to be dumped or just the first entry of each parameter array. See Appendix C for output file formats.

5.1.10 dosdr Average Science Data

The science data averaging routine, **sciavg**, runs on a record-to-record basis and performs two similar but distinct functions: the creation of science averages files and the creation of science database files. The basic algorithm is the same for both processes, but the creation of database science files requires special handling to insure that land data are not used during computations.

The **sciavg** processing begins with checking the mode of the current science record. The worse mode of the two modes is assigned to the variable **WorseMode**. This variable is checked against the modes that the user has selected for processing. If **WorseMode** is not one of the user-selected modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

A special-case routine for checking the modes of the current science record against previous modes is performed for the creation of database science files. The purpose of this routine is to use only the best data in the averaging interval. This is done by comparing the better mode of the current record with the best mode yet seen in the interval. If the better mode of the current record is worse than the best mode yet seen, then the record is marked as bad by setting the variable **GoodRec** to FALSE. If the better mode of the current record is better than the best mode yet seen, the statistics for the interval are cleared and processing continues. Figure 5-5 shows the order by which modes are compared.

Another check is performed when processing database science files to ensure that land data does not corrupt the database. If the LandWater flag does not indicate Deep-Water, the record is marked as bad by setting the variable **GoodRec** to FALSE.

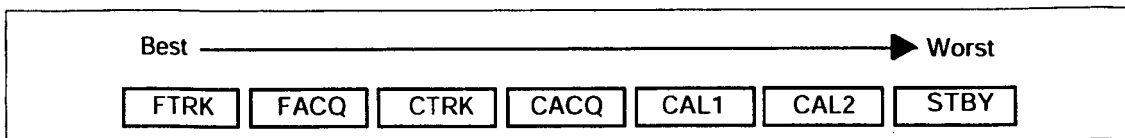


Figure 5-5 SDR Mode Comparison

If this record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval. If so, the **WriteData** flag is set. Other conditions which would set the **WriteData** flag include a CAL step change, an End-of-File condition, or a difference between the worst mode of the averaging interval and the worst mode of the current record.

If the **WriteData** flag has been set, averages are computed for the current interval. RMS statistics are also computed using the Hayne method of scaling the RMS of the height differences to compute Ku and C band RMS. The **UseFlag** parameter is set to false if any of the following conditions are true:

- If the worst mode of the interval is not FTRK.
- the number of records used in the interval is less than one-half the averaging interval.
- the number of T1016 Data Quality Flags (**FlgAGC1016Ku** and **FlgAGC1016C** and **FlgSWH1016Ku** and **FlgSWH1016C** and **FlgHgt1016C** and **FlgHgt1016Ku** and **FlgHgtRate1016**) is greater than zero.
- the number of T5110 Waveform Flags (**FlgHi5110** and **FlgLo5110**) is greater than zero.

If the **GoodRec** flag is set to FALSE, the process returns.

A special case check of T1016 Data Quality flags (**FlgAGC1016Ku** and **FlgAGC1016C** and **FlgSWH1016Ku** and **FlgSWH1016C** and **FlgHgt1016C** and **FlgHgt1016Ku** and **FlgHgtRate1016**) is performed for the creation of database science files. If one of these flags is set, the **GoodRec** flag is set to FALSE and the process returns.

Next, WFF Algorithm S5134 is run to compute Estimated Attitude, and the values of the primary science parameters are added to the statistics for the current interval. At this point, **sciavg** is complete and returns. See Figure 5-6 for a processing overview. See Appendix C for output file formats.

5.1.11 dosdr Average Engineering Data

The engineering data averaging routine, **engavg**, runs on a record-to-record basis and creates engineering average and database files. The module produces output records at the full-rate minimum, full-rate maximum, and interval average of engineering parameters.

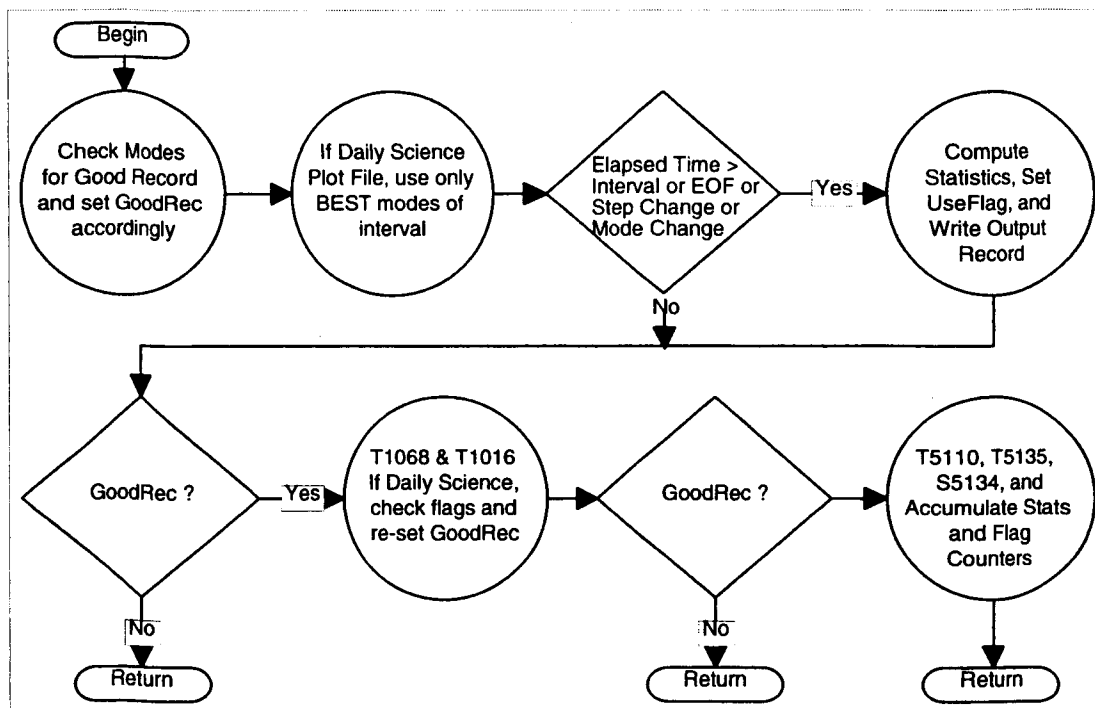


Figure 5-6 SDR sciavg Processing

The **engavg** processing begins with checking the mode of the current engineering record. The mode is checked against the modes that the user has selected for processing. If the mode is not one of the user-selected modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a GoodRec, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval. If so, the **WriteData** flag is set. Other conditions which would set the **WriteData** flag include an End-of-File condition, or a mode change to/ from CAL or IDLE.

If the **WriteData** flag has been set, averages are computed for the current interval and data are then written to the output file.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, the values of the primary engineering parameters are accumulated. Full-rate minimum and maximum values are checked and saved if necessary. At this point, **engavg** is complete and returns. See Figure 5-7 for a processing overview. See Appendix C for output file formats.

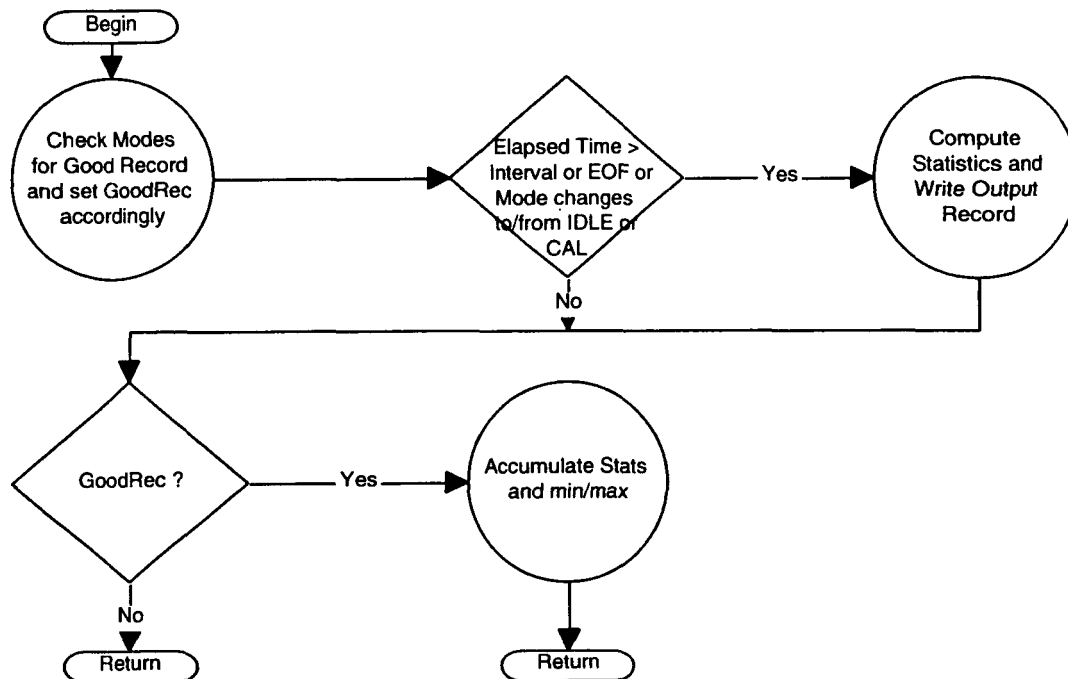


Figure 5-7 SDR engavg Processing

5.1.12 dosdr Waveform Averaging

The waveform averaging routine, **wfavg**, runs on a record-to-record basis and creates high and low rate waveform average files.

The **wfavg** processing begins with checking the mode of the current science record. The mode is checked against the modes that the user has selected for processing. If the mode is not one of the user-selected modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval. If so, the **WriteData** flag is set. Other conditions which would set the **WriteData** flag include an End-of-File condition, a CAL step change, or a mode change.

If the **WriteData** flag has been set, averages are computed for the current interval and data are then written to the output files.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, the values of the standard waveform parameters are accumulated. At this point, **wfavg** is complete and returns. See Figure 5-8 for a processing overview. See Appendix C for output file formats.

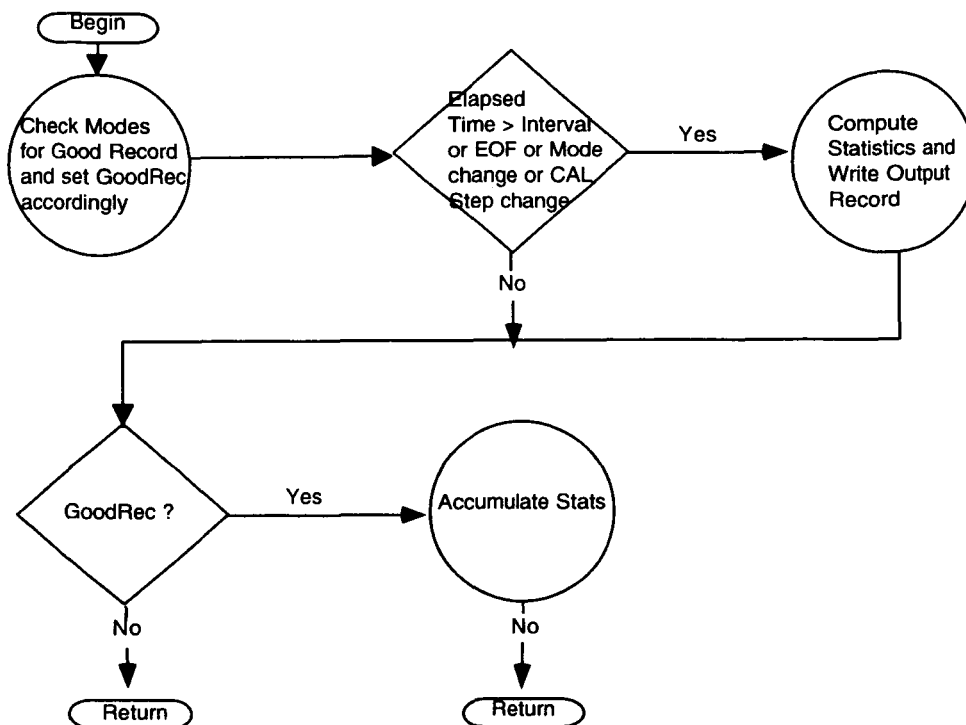


Figure 5-8 SDR wfvavg Processing

5.1.13 dosdr Report Status Changes

The Report Status Changes routines, **scistatus** and **engstatus**, check for record-to-record differences in user-specified parameters and optionally compare memory dumps to **DataFile.ROMMap**, the reference memory map. Table 5-5 lists the parameters checked for each user-specified option.

Table 5-5 Parameters Checked by Report Status Changes Options

Option	Source	Parameters Checked
All Parameters	Science	Status, Flags, Times, Commands, Memory,
All Parameters	Engineering	Status, Flags, Times, Commands, Memory,
Status Bytes	Science	CALAttenKu, CALAttenC, SynchModeByte, ModeChange-Byte, CurrModeByte, TestModeByte, OperModeByte, Limit-Bytes, Mode, Track, AGCType, KuOn, COOn, AltOper, WFFreqHi, WFFreqLo
Status Bytes	Engineering	EngMode, BiLevels, EngAltOper

Table 5-5 Parameters Checked by Report Status Changes Options (Continued)

Option	Source	Parameters Checked
Flags	Science	OOEWFlag, OrderFlag, UTCCnvFlag, InterpQualFlag, FlgMode1068, FlgTrack1068, FlgHgt1016Ku, FlgHgt1016C, FlgAGC1016Ku, FlgAGC1016C, FlgSWH1016Ku, FlgSWH1016C, FlgHgtRate1016, FlgTempLo1016, FlgTempHi1016, FlgAtt1016, FlgNoCorr1165, FlgVattWF5135Ku, FlgVattWF5135C
Flags	Engineering	FlgEC4108, FlgER4108, FlgES4108, FlgBlE4109, EngOrder Flag, EngUTCCnvFlag
Times	Science	Elapsed clock time, elapsed UTC time
Times	Engineering	Elapsed clock time, elapsed UTC time, Last Reset time
Commands	Science	LastICACMD, LastATACMD
Commands	Engineering	LastCMDType, LastCMD, Last CMDStatus
Memory	Engineering	MemDumpAddr, MemDump, EngMemChkSum
Database	Science	times, Commands, KuOn, COn, AltOper, WFFreqHi, WFFreqLo
Database	Engineering	Times, Commands, Compare Memory, MemDumpAddr, EngMemChkSum, BiLevels

5.1.14 dosdr calavg

The CAL mode processing routine, **calavg**, runs on a record-to-record basis and creates CAL average and database files. Reference CAL values are subtracted from the averages to compute deltas. **calavg** skips data at the beginning of each CAL mode and each CAL1 step to allow for settling, and temperature-corrects the AGC data.

The **calavg** processing begins by checking the mode of the current science record. If the mode is not one of the CAL modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval, or more likely, if the CAL mode or Step has changed. If so, the **WriteData** flag is set.

If the **WriteData** flag has been set, averages are computed for the current interval and references subtracted from the averages. Data are then written to the output file. See Appendix D for the current CAL mode references.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, at the start of CAL1 or a Step change, one CAL record is skipped. At the start of CAL2, nine records are skipped. If insufficient records have been skipped, the process returns.

If sufficient records have been skipped, CAL1 AGC is CAL-Attenuator temperature-corrected and the values of the CAL parameters are accumulated. At this point,

calavg is complete and returns. See Figure 5-9 for a processing overview. See Appendix C for output file formats.

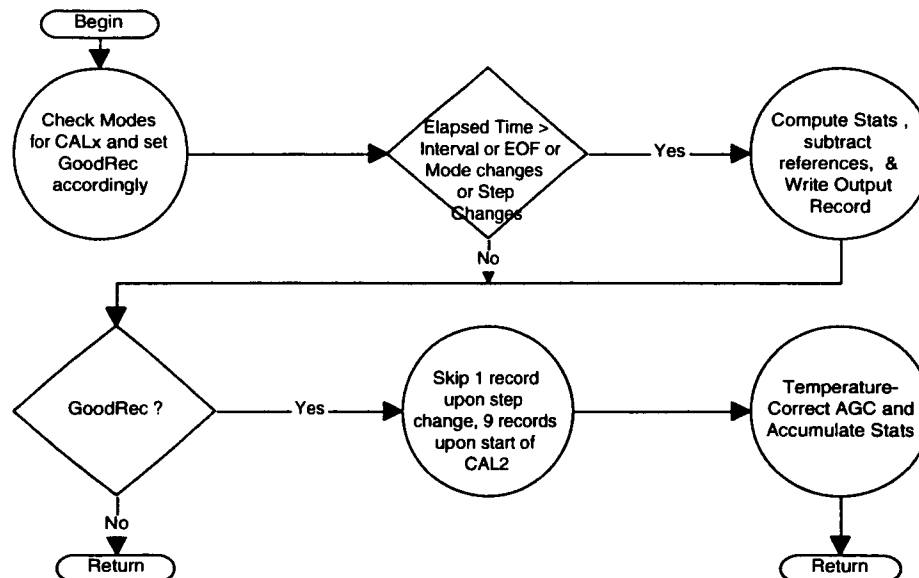


Figure 5-9 SDR calavg Processing

5.1.15 dosdr CreateGDR

creategdr, the IGDR creation routine, uses WFF Algorithms and some WFF-coded JPL Algorithms to create a pseudo-IGDR. This is primarily used for algorithm testing and debugging purposes, and is not an attempt to create an exact replica of an "official" JPL IGDR. Table 5-6 lists the algorithms used in the IGDR creation process.

Table 5-6 Algorithms Used in **creategdr**

Algorithm	Developer	Implementation Notes
S1015	WFF	Complete Implementation. (Pass1)
S1017	JPL	Uses only WFF-Generated Variables. (Pass1)
S1018	WFF	Complete Implementation. (Pass1)
S1019	JPL	Uses only WFF-Generated Variables. (Pass1)
S5134	WFF	Complete Implementation. (Pass2)
S1037	WFF	Complete Implementation. (Pass2)
S1039	WFF	Complete Implementation. (Pass2)
S1036	WFF	Complete Implementation. (Pass2)
S1035	WFF	Complete Implementation. (Pass2)

Table 5-6 Algorithms Used in `creategdr` (Continued)

Algorithm	Developer	Implementation Notes
S1034	WFF	Complete Implementation. (Pass2)
S1022	JPL	Uses only WFF-Generated Variables. (Pass2)
S1045	WFF	Complete Implementation. (Pass2)
S1044	WFF	Complete Implementation. (Pass2)
S1023	JPL	Uses only WFF-Generated Variables. (Pass2)
S1051	WFF	Complete Implementation. (Pass2)
S1024	JPL	Uses only WFF-Generated Variables. (Pass2)
G1050	WFF	Complete Implementation. (Pass2)
G1064	WFF	Complete Implementation. (Pass2)
G1043	WFF	Complete Implementation. (Pass2)

Algorithm S1015 Height Acceleration Computation complicates the `creategdr` processing since it needs to use three frames of data rather than one. Because of this, the `creategdr` processing uses a two-pass methodology. The first pass is run before the main `dosdr` processing loop is entered. This pass is called **AccelDriver** and reads the whole SDR file, using algorithms S1015, S1017, S1018 and S1019 to create an intermediate Acceleration File. The second pass is a process called from the main processing loop which synchronizes data in the Acceleration File with data read during the regular processing, and processes the rest of the algorithms.

5.2 SDR Databases

FoxBase/Mac is used as the TOPEX SDR Database management system. The database Main Menu is depicted in Figure 5-10. Using this system, SDR data can be imported, exported, sorted, and searched. Special-purpose programs can be created to perform specific processing on the SDR data prior to exporting. Since the SDR databases are no longer being actively maintained, data from only Cycles 01-22 are currently available. Database structures are documented in Appendix C.

5.2.1 SDR Databases Append Data

Files created by the `dosdr` database processing routines are imported into and appended to the SDR databases. The Append Menu is shown in Figure 5-11. Due to standard naming conventions, the user is prompted to pick one of the five import files. The database program then computes the other four filenames and checks for the existence of those files. If any of the five files are missing or misnamed, the import process is canceled. If all files exist, then the program imports the data from each file into the appropriate database. Table 5-7 lists the files required to import data.

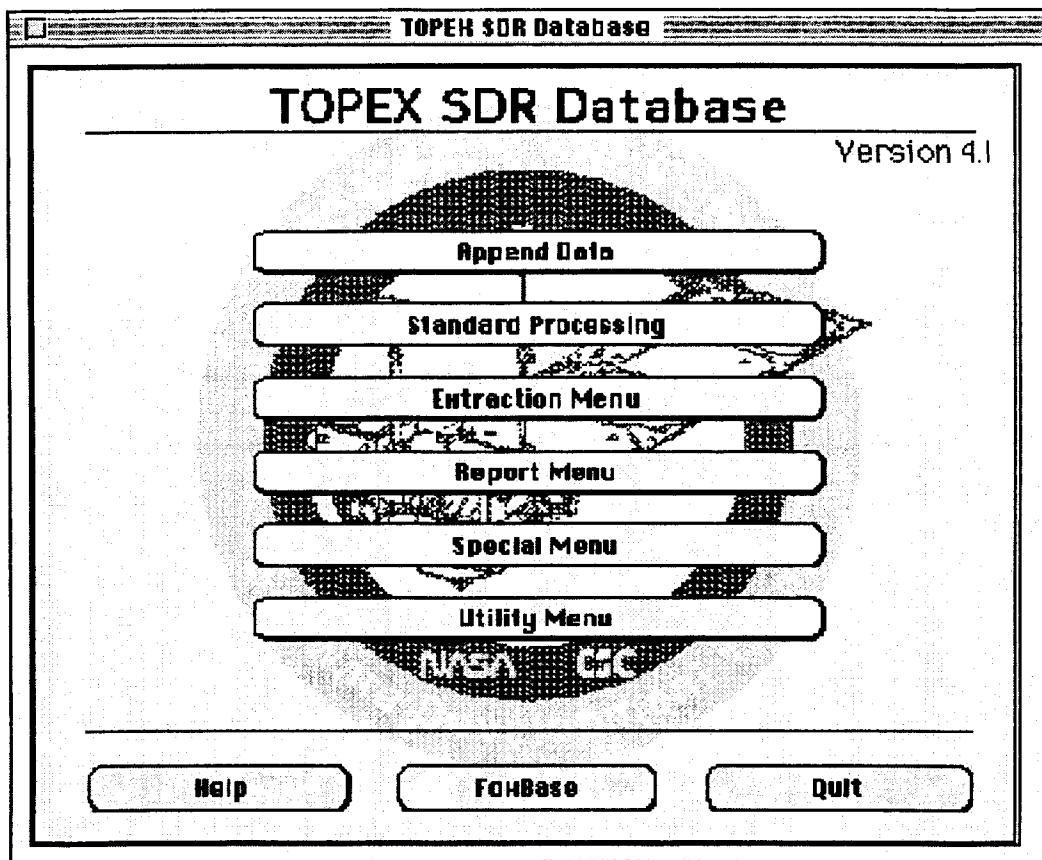


Figure 5-10 TOPEX SDR Database Main Menu

5.2.2 SDR Databases Export Data

The SDR database system allows a user to extract data according to specified criteria. There are currently three extraction files available: Science, CAL, and Engineering. The user may select from a range of dates and specific conditions to restrict the data extraction. The extraction files are written in the same format as the corresponding databases. See Appendix C for the database export file formats.

5.3 SDR IDL Software

IDL, Interactive Data Language, is a software package written by Research Systems, Inc. It is an array-based scientific visualization package that enables a programmer to quickly and easily write code to generate highly customized plots and analyses. IDL allows the TOPEX SWDT to automatically generate products that were difficult and time-consuming to produce using COTS software.

TOPEX IDL programs generally can read `dosdr` average files or database export files, and produce standardized plots on a PostScript printer. These programs are coded with a set of parameters which may be modified to customize features of the final

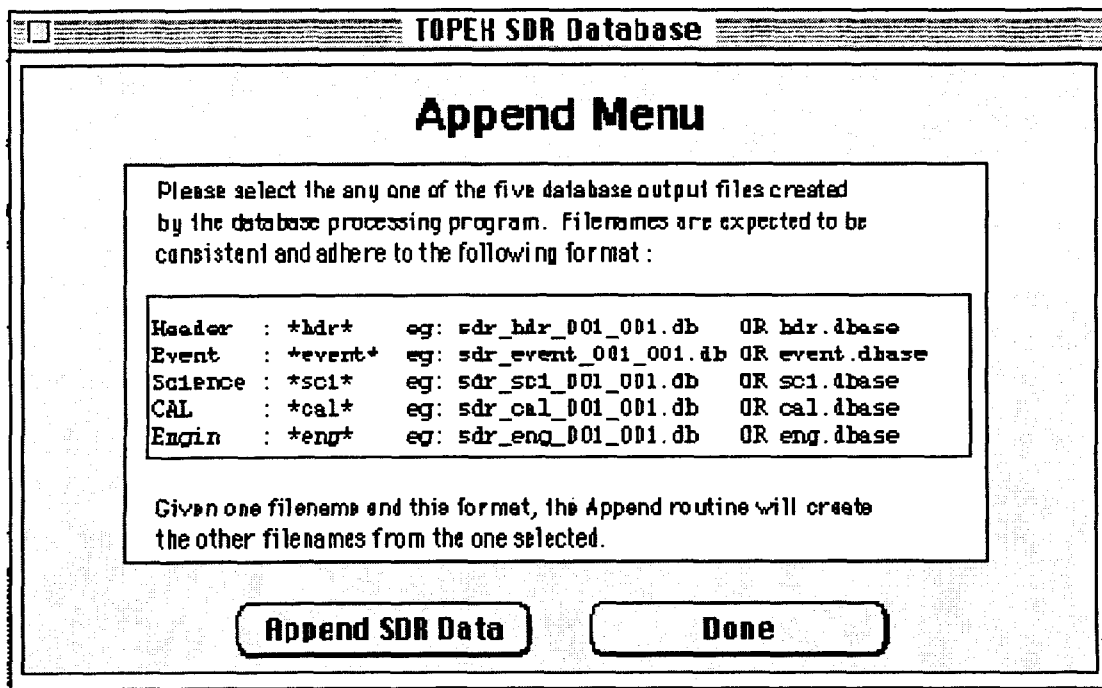


Figure 5-11 SDR Database Append Menu

Table 5-7 SDR Database Import Files

Std. Filename	Database	Description
cal.dbase	cal	Concatenated files of dosdr cal output.
hdr.dbase	header	Concatenated files of dosdr headers output.
eng.dbase	engin	Concatenated files of dosdr 1-hour engineering output.
sci.dbase	sci	Concatenated files of dosdr 1-minute science output.
event.dbase	event	Concatenated files of dosdr events output.

output without changing the IDL code. Table 5-8 lists the standard parameters that may be modified by the user. Appendix B lists the UNIX scripts which run TOPEX IDL programs.

Table 5-8 IDL Parameters

Parameter	Default	Description
InputFile	n/a	Text file from which data to be processed are read.
XPlots	varies	Number of plots stacked horizontally per page.

Table 5-8 IDL Parameters (Continued)

Parameter	Default	Description
YPlots	varies	Number of plots stacked vertically per page.
Printer	topex2	Printer where output will be printed.
AutoScale	FALSE	Switch to automatically set axis scales by min & max of data, rather than by standard scale values.
LandScape	varies	Switch to print in landscape rather than portrait mode.
DeviceType	'ps'	Type of device driver to use (ps = PostScript).
PlotTitle	InputFile	Title to place on plot. May be overridden by program.
Color	TRUE	Switch to define that color should be used for output.
Scale	1.0	Factor by which to scale whole page. Useful for incorporating output in presentations or publications.
Manual	FALSE	Switch to define that printer should be set to Manual Feed mode. Highly printer-dependent.
All	FALSE	Switch to define that all output products should be printed rather than the standard subset. Used by only some programs.
SinceLast	TRUE	Switch to define that output data should be subsetted by a pre-defined interval. Useful for restricting Launch-to-Date output.

5.4 UNIX Scripts

UNIX scripts are used to automate common tasks and supply standard parameters to TOPEX SDR software. Shell scripts invoked by the crontab facility are used to perform daily processing. Other shell scripts are used for automatically retrieving and processing special data from JPL, automatically running IDL programs, and running miscellaneous utility functions. Appendix B contains a list of UNIX scripts which are available for use.

5.5 Track-Mode Waveform Monitoring

tpx_sdr_wfmon is a FORTRAN program that creates an output file of 10 second averaged Track-Mode waveforms. See Table C-9 "Track-Mode Waveform Averages Format" for the output format.

5.5.1 Track-Mode Waveform Monitoring Database

A database has been created with data starting at Cycle 10 (1992-362T11:35:48) to present, using only Passes 157-182 of each cycle.

5.5.2 Track-Mode Waveform Monitoring IDL Software

sdr_wfmon_hist provides histogram plots of selected parameters, based on the criteria of selected Gate Indexes. The histograms depict the distribution of VSWH and

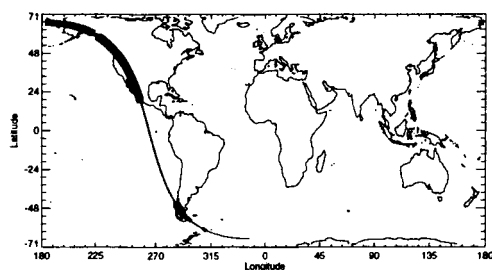
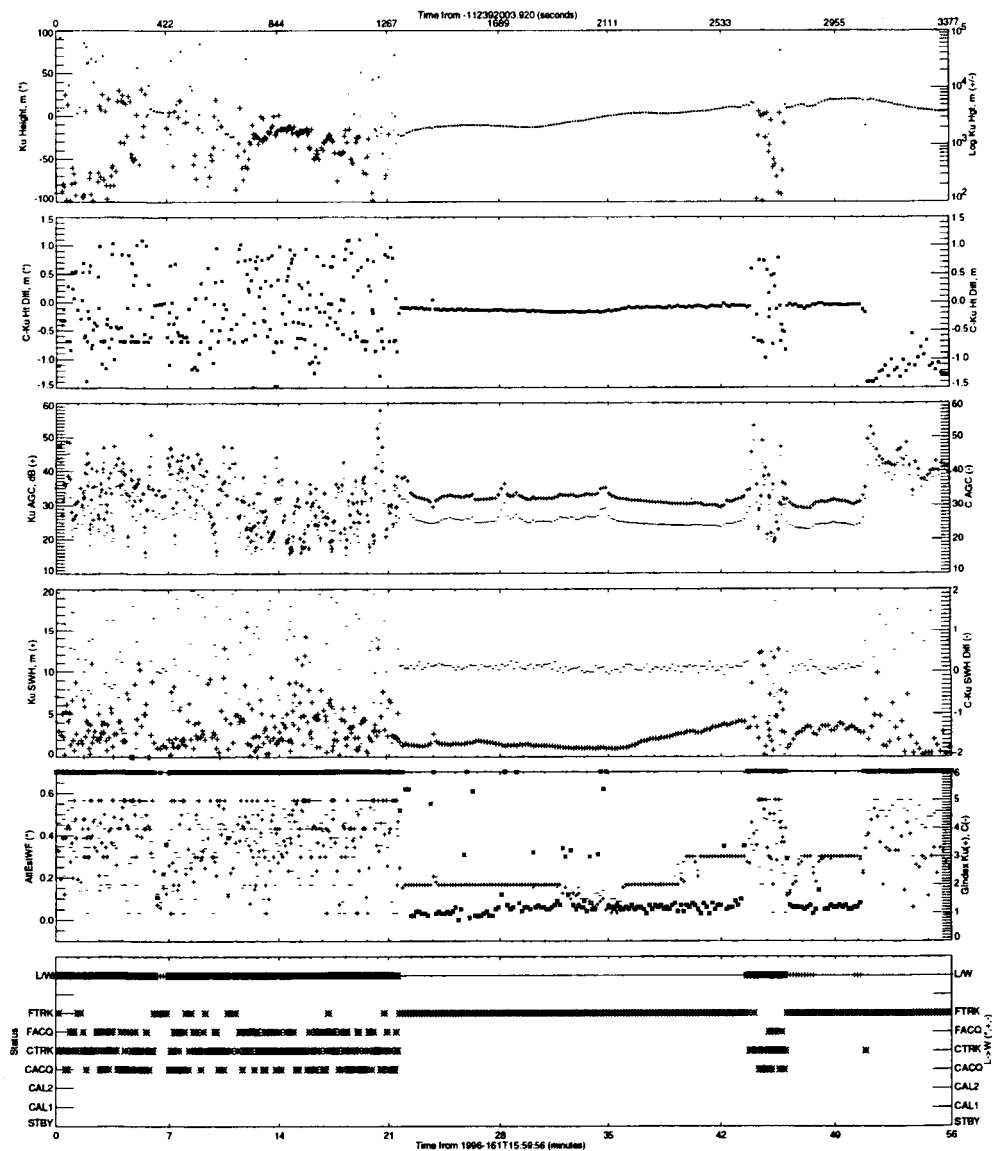
VAttWF, with the criteria of GateIndexes between: 1.0 to 1.5; 1.5 to 2.5; 2.5 to 3.5; and 3.5 to 4.5. A sample plot is shown in Figure A-4 of Appendix A.

sdr_wfmon_trend provides time-history plots of selected gates, using the criteria of selected parameters and the parameters' values. The output waveform plots are time series of gate values for Track TLM Gates 8 to 15, and are based on the multiple criteria of: GateIndex being between 1.0 and 1.3; VSWH being between 145 and 155; and VATTWF being between 1.1 and 1.2. A sample plot is shown in Figure A-5 of Appendix A.

Appendix A

Standard Products

This appendix contains samples of the standard products produced by the TOPEX SDR software. A note is made, where appropriate, detailing the frequency of production of the product.



CYCLE 137, PASS 180

Input File: sdr_sci_137_180.std
 NumRec = 468, Interval = 10
 Summary created Tue Oct 8 14:23:34 1996
 No Version Info Available

Figure A-1 Pass Plot

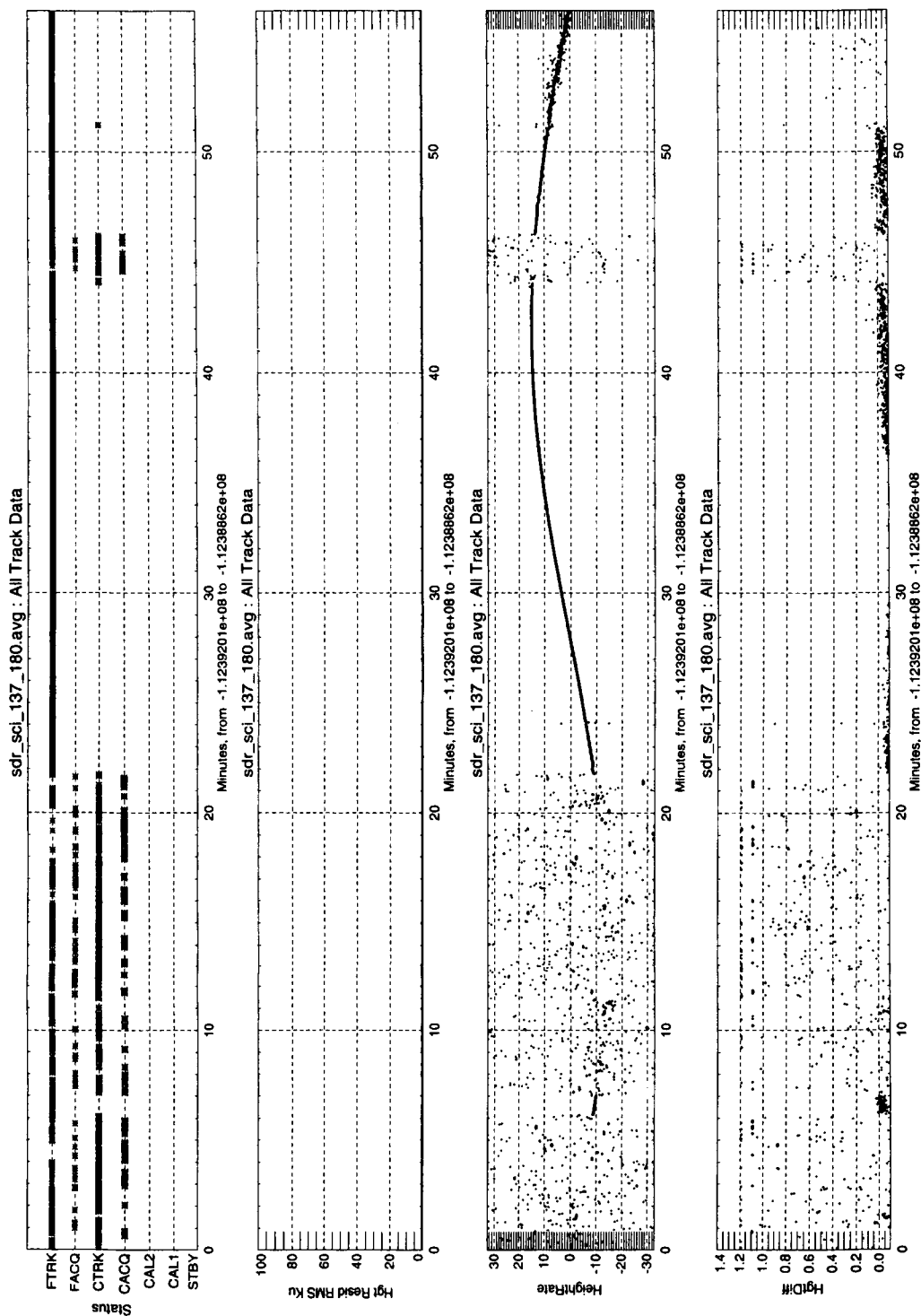


Figure A-2 Science Average Plot

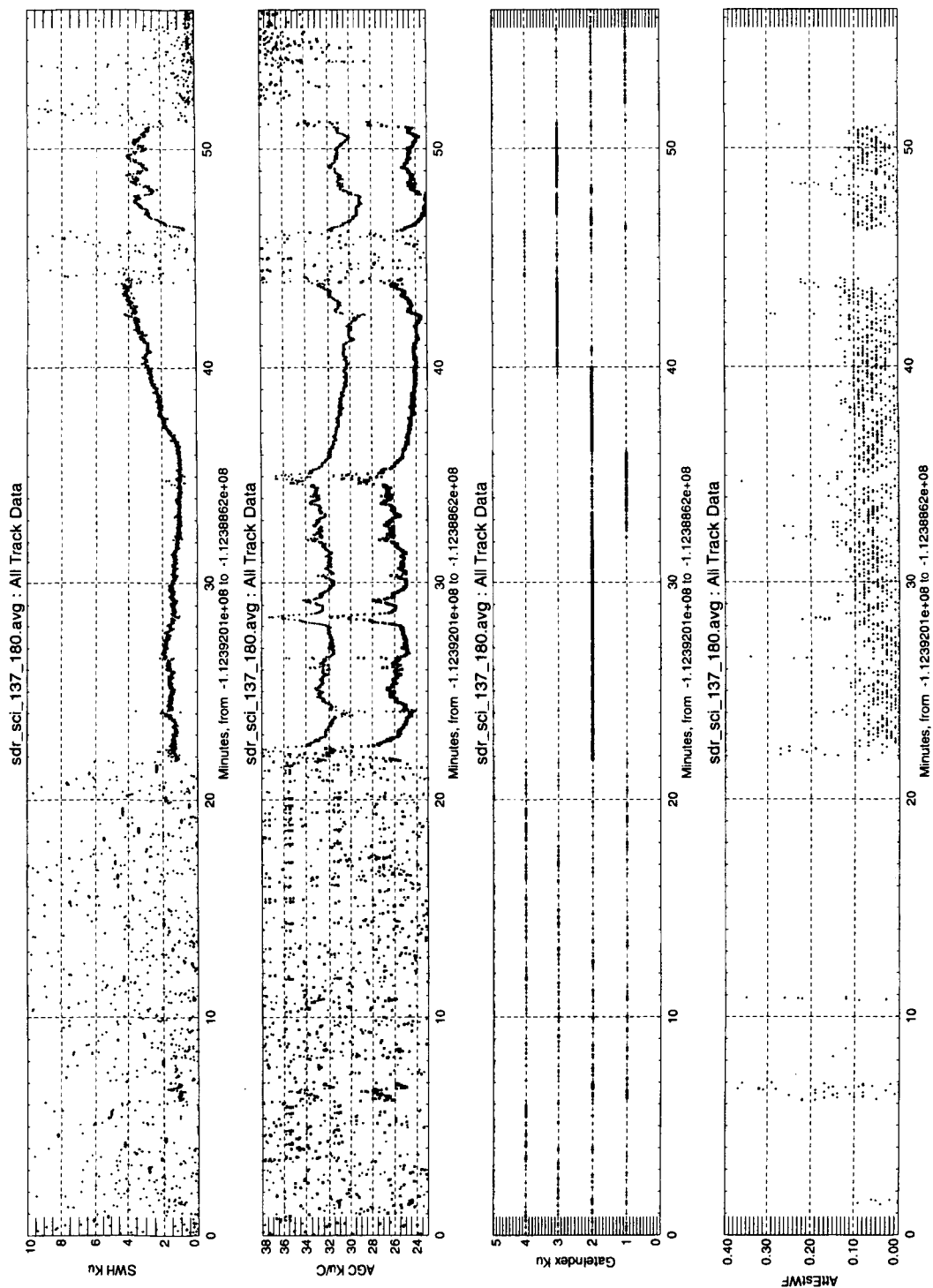


Figure A-2 Science Average Plot (Continued)

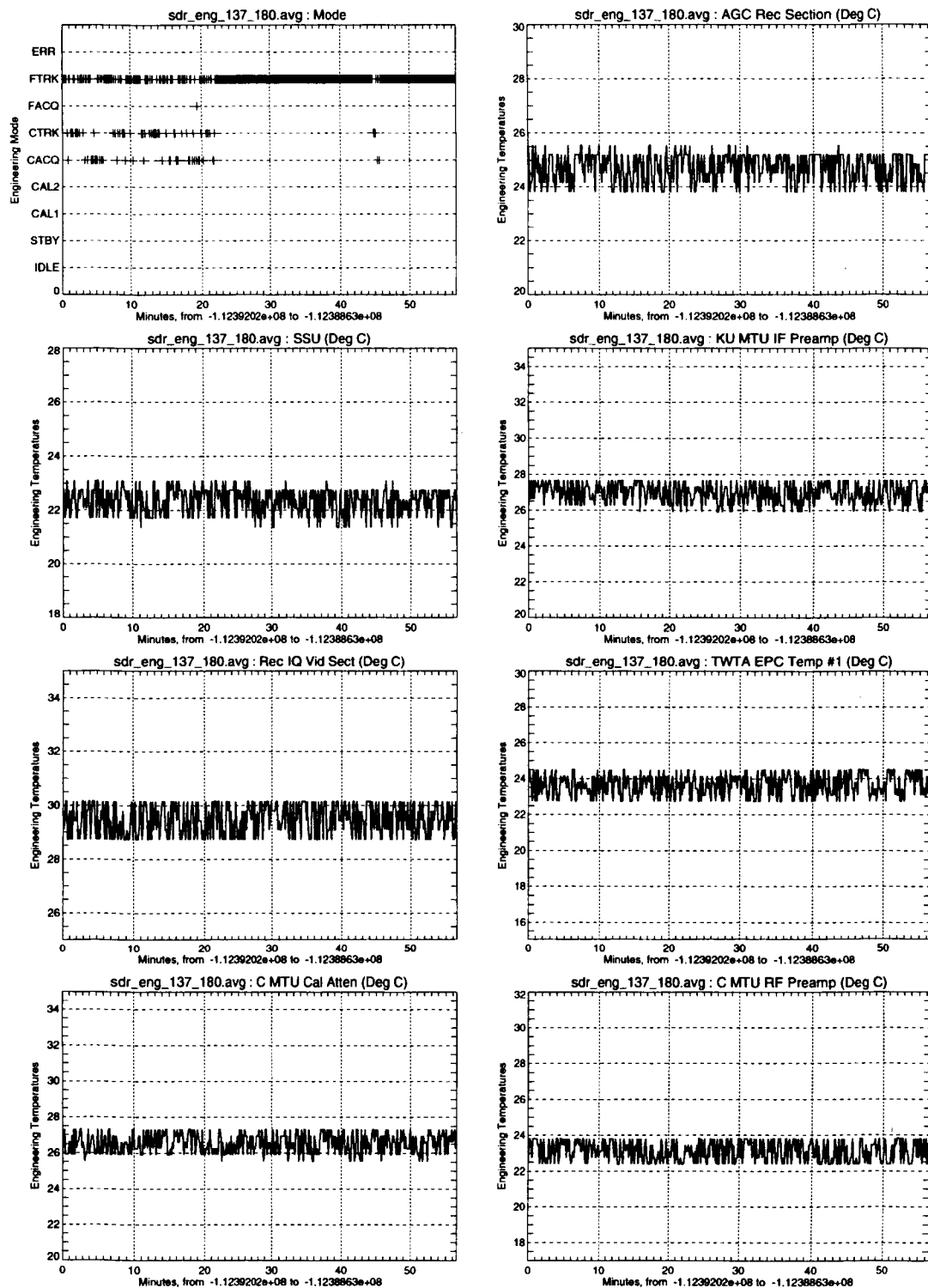


Figure A-3 Engineering Averages Plot

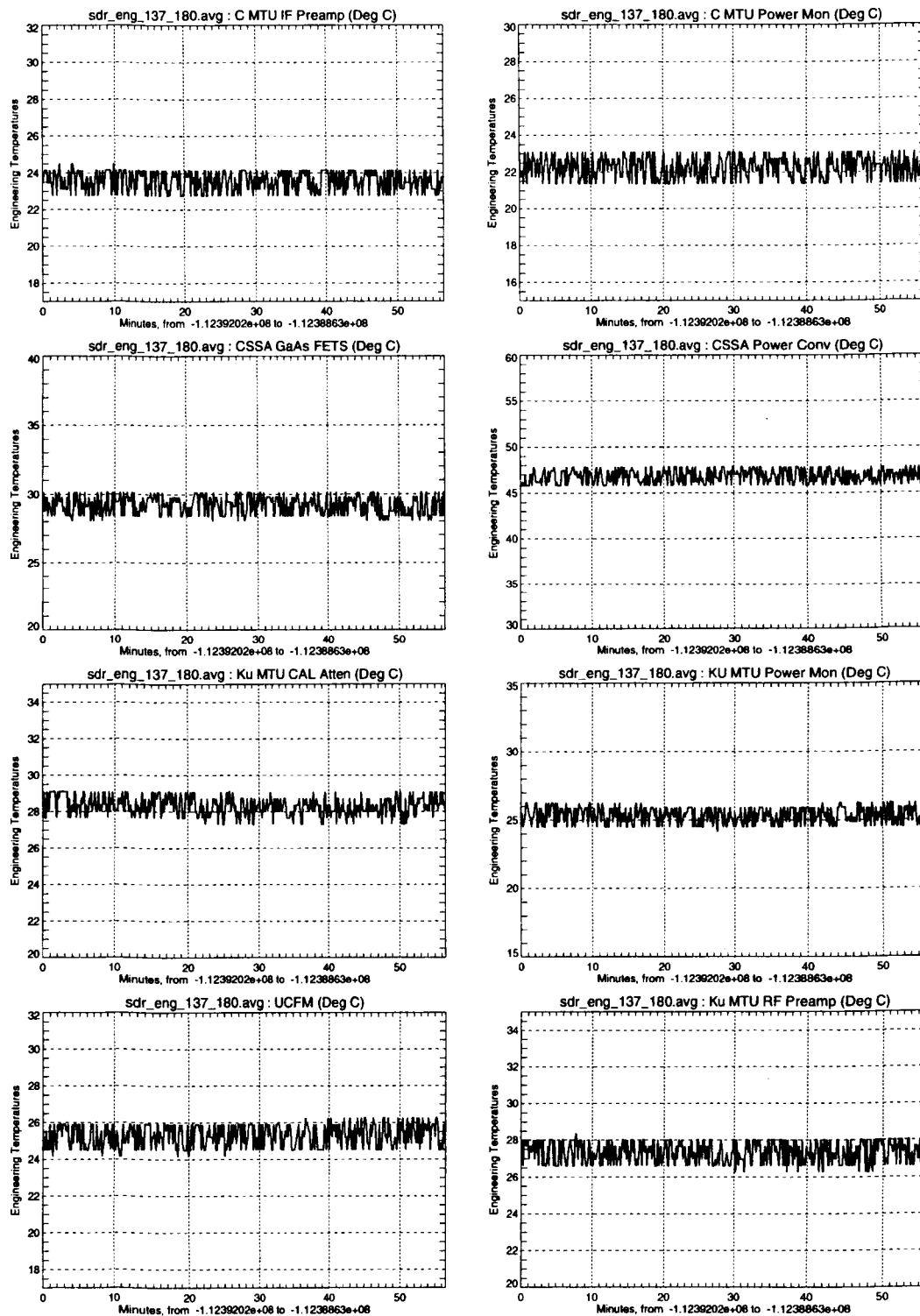


Figure A-3 Engineering Averages Plot (Continued)

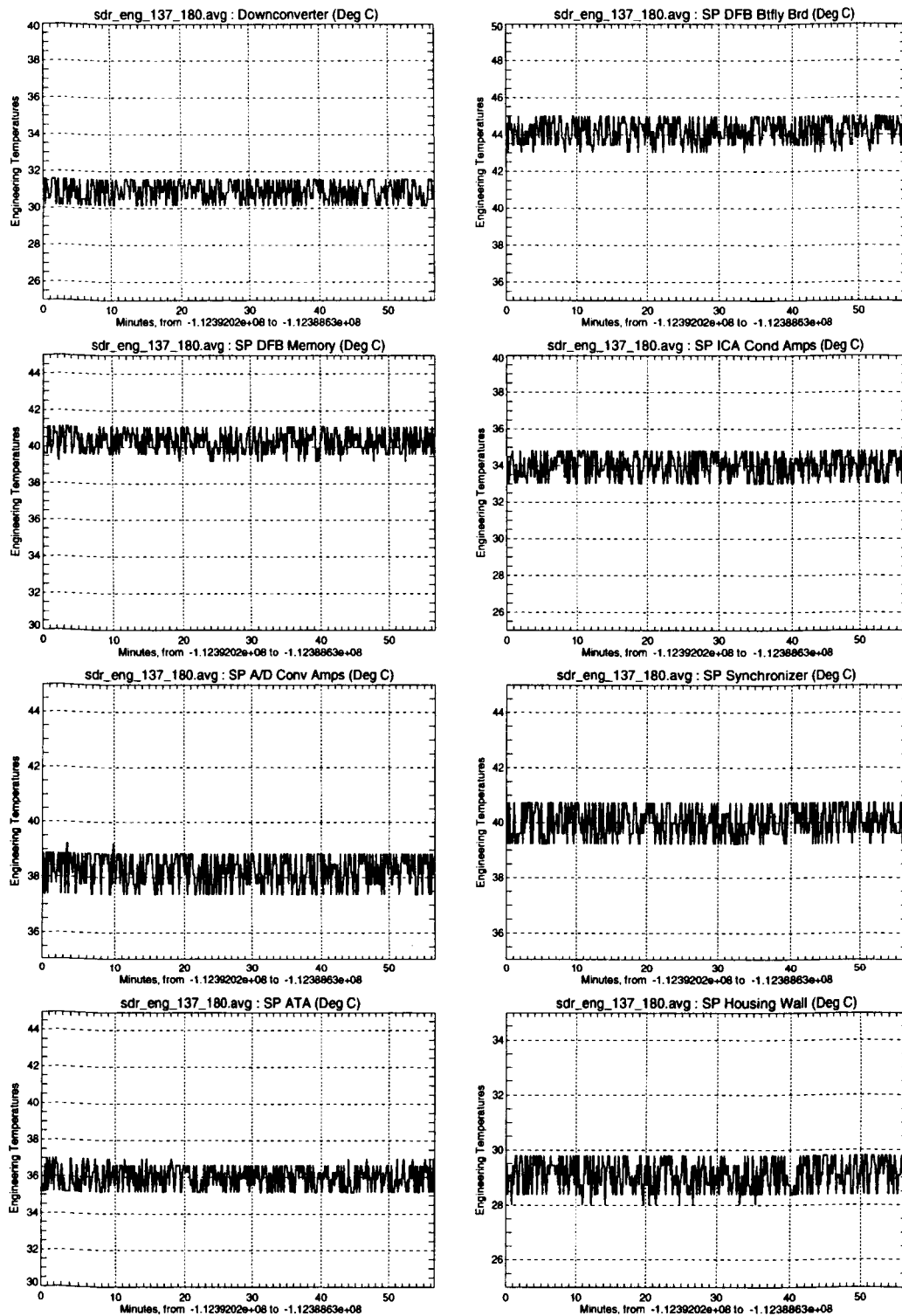


Figure A-3 Engineering Averages Plot (Continued)

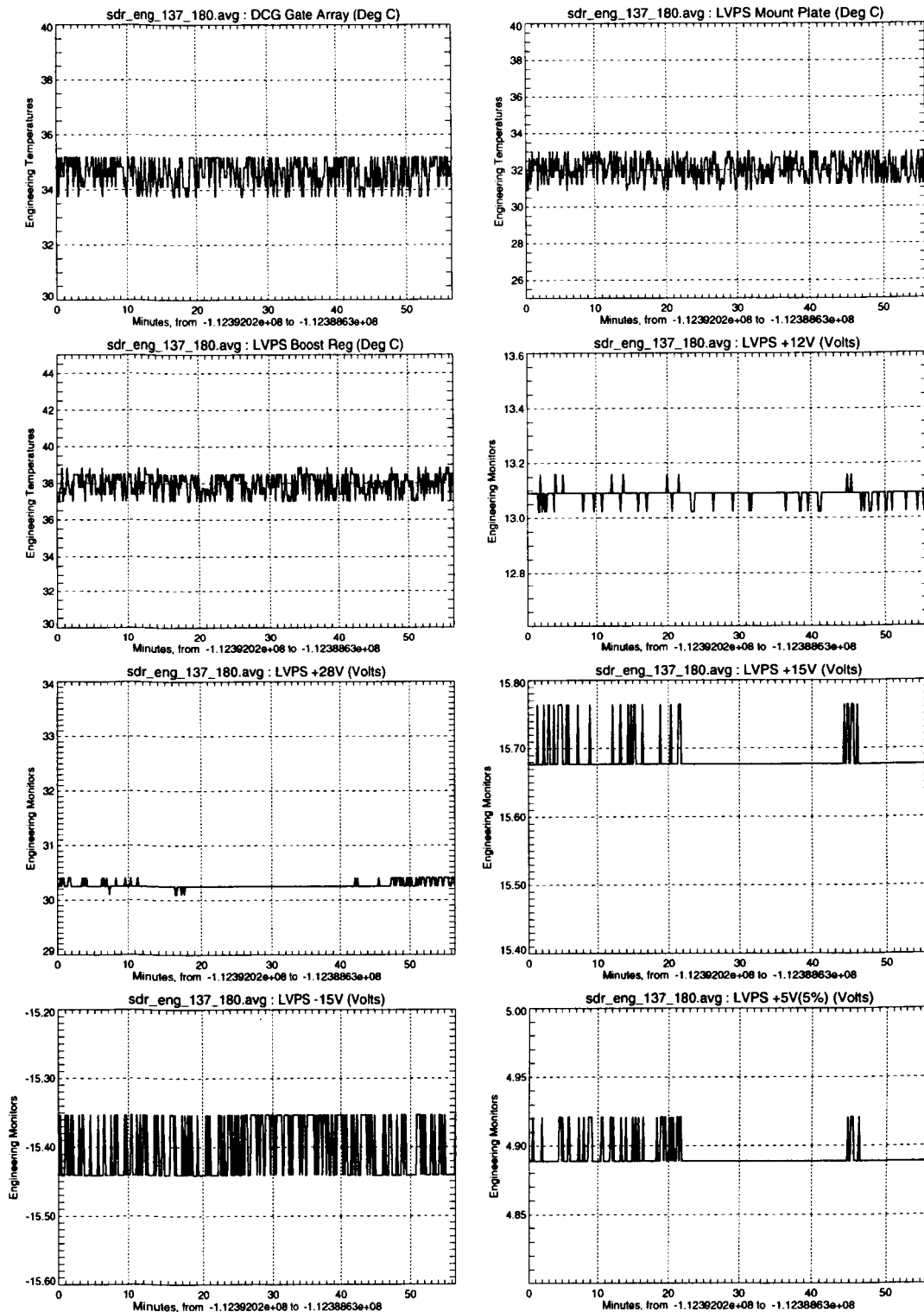


Figure A-3 Engineering Averages Plot (Continued)

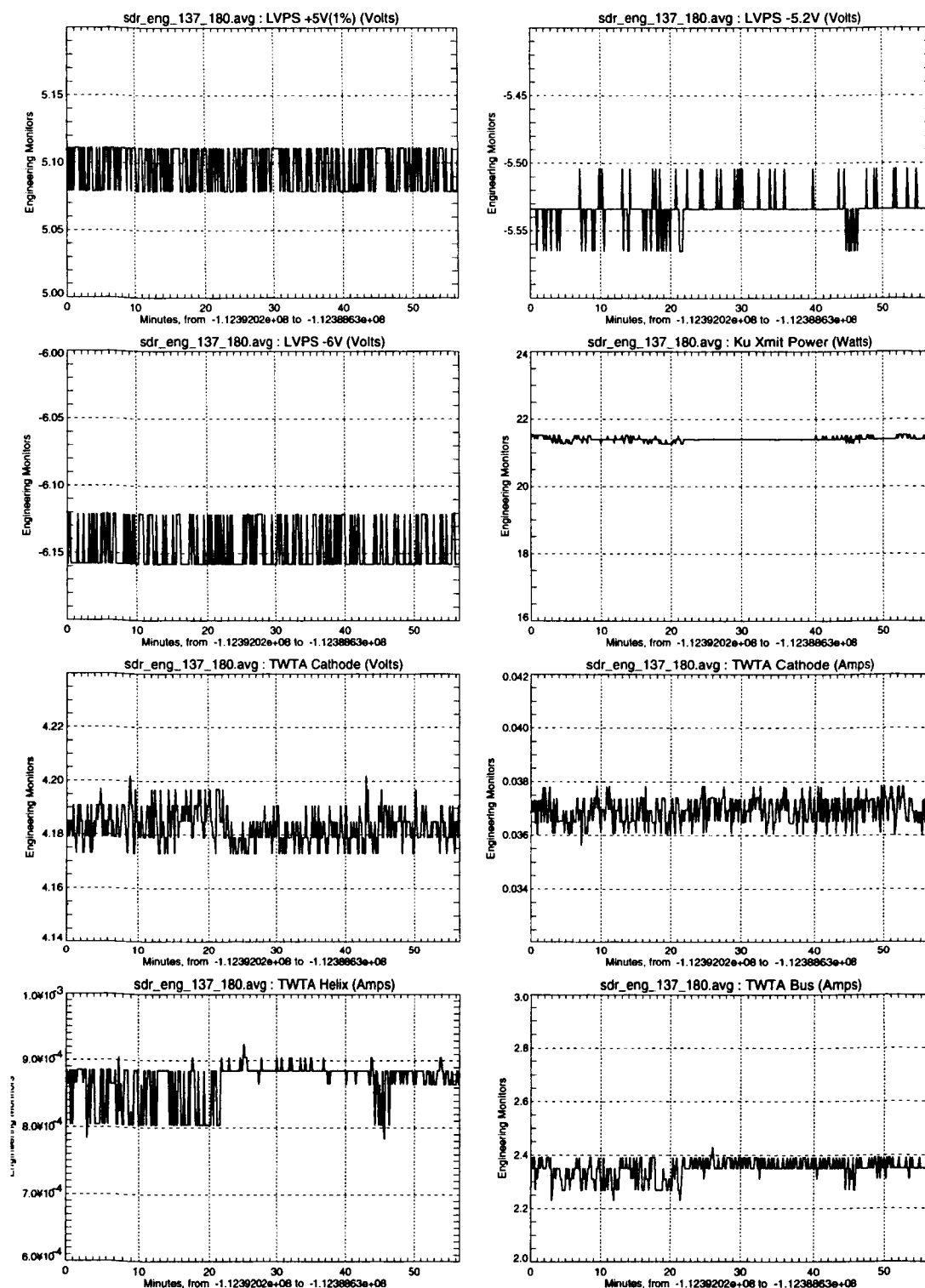


Figure A-3 Engineering Averages Plot (Continued)

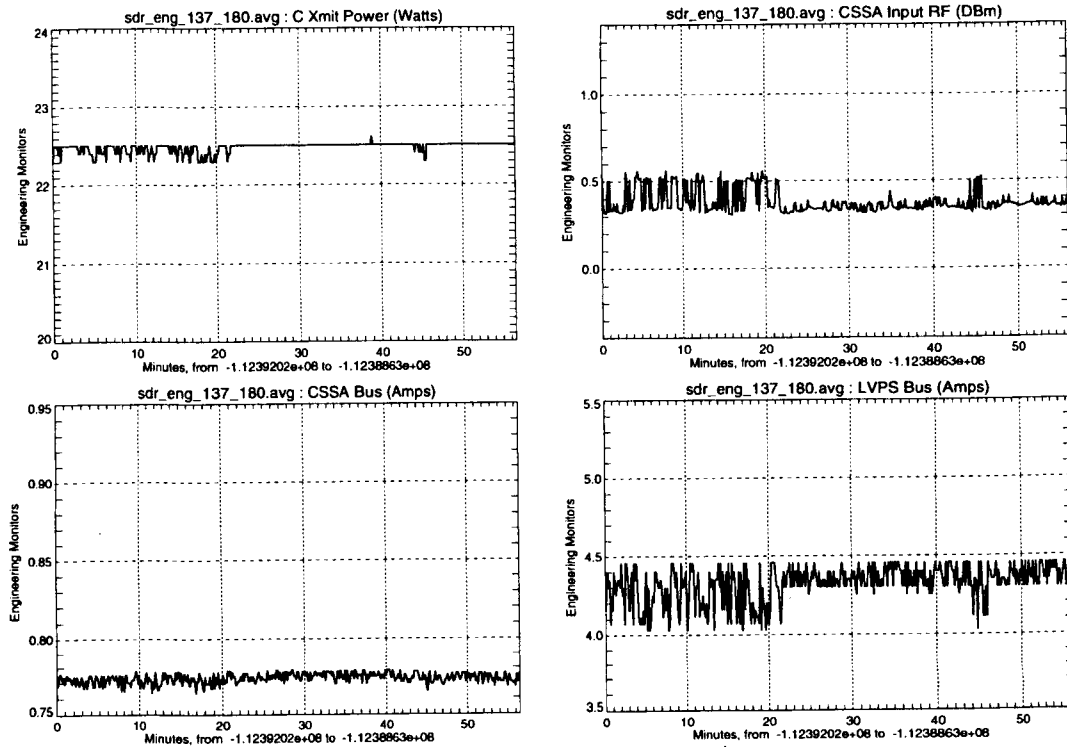


Figure A-3 Engineering Averages Plot (Continued)

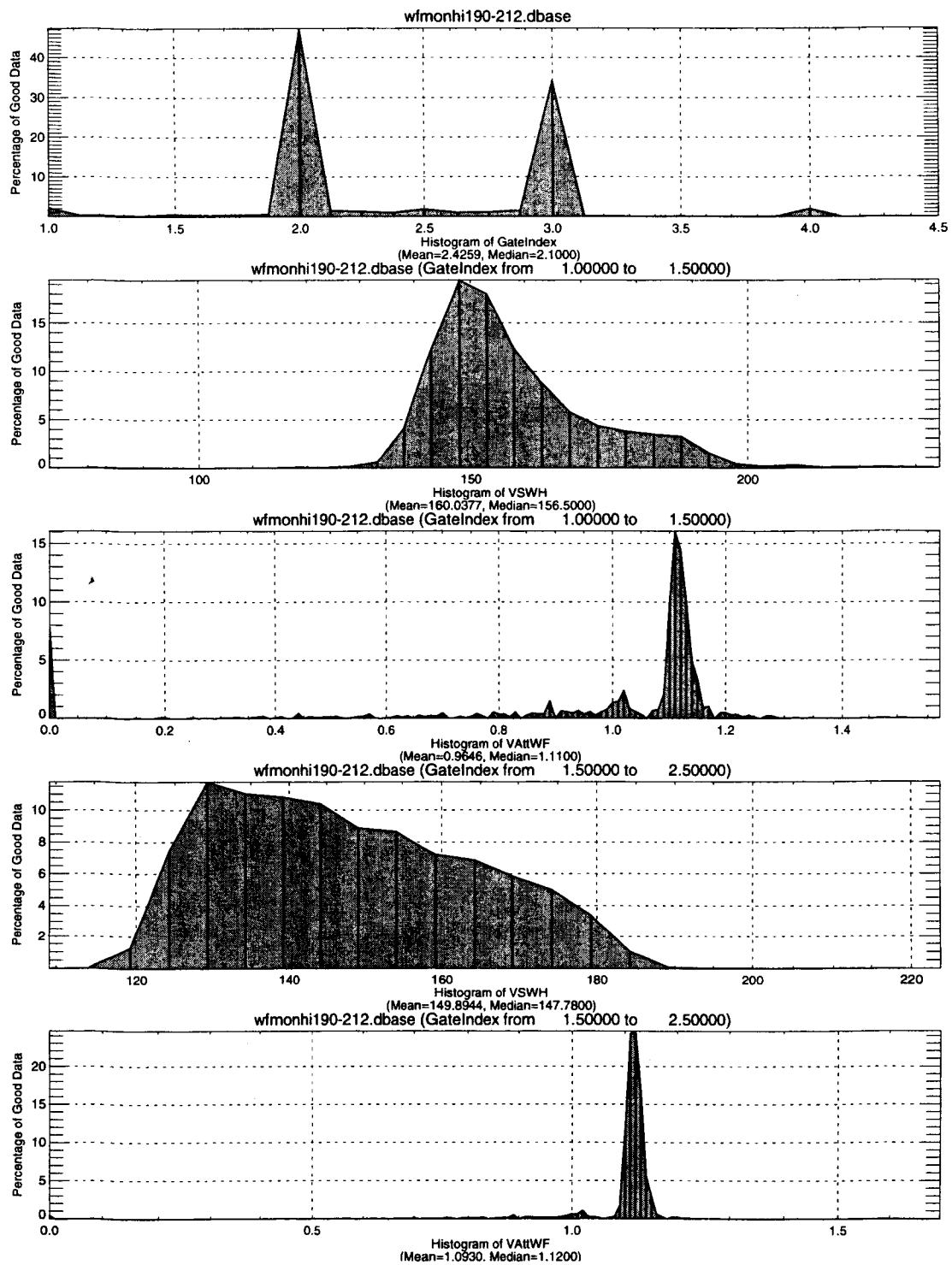


Figure A-4 SDR_WFMON_HIST Plot

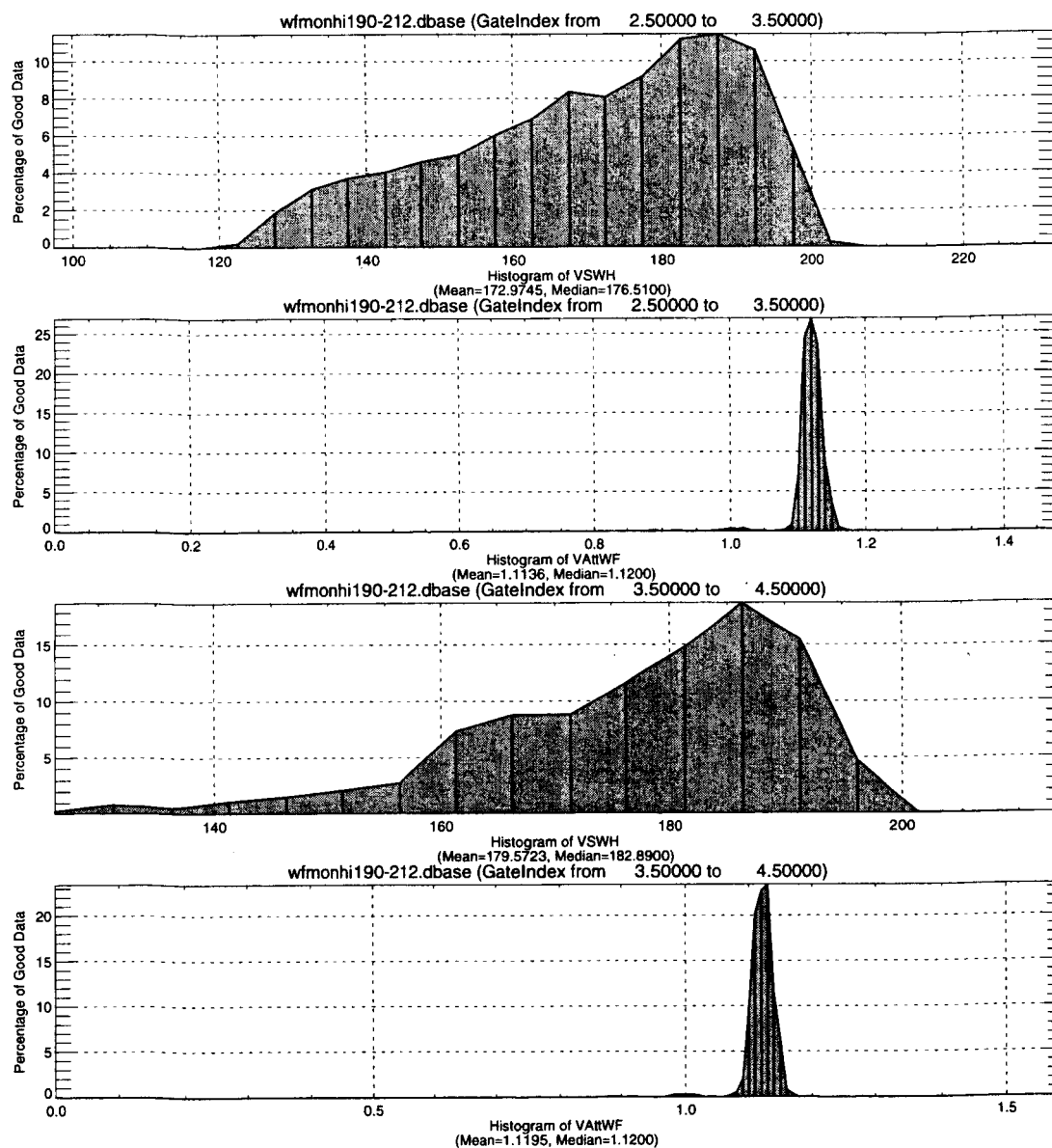


Figure A-4 SDR_WFMON_HIST Plot (Continued)

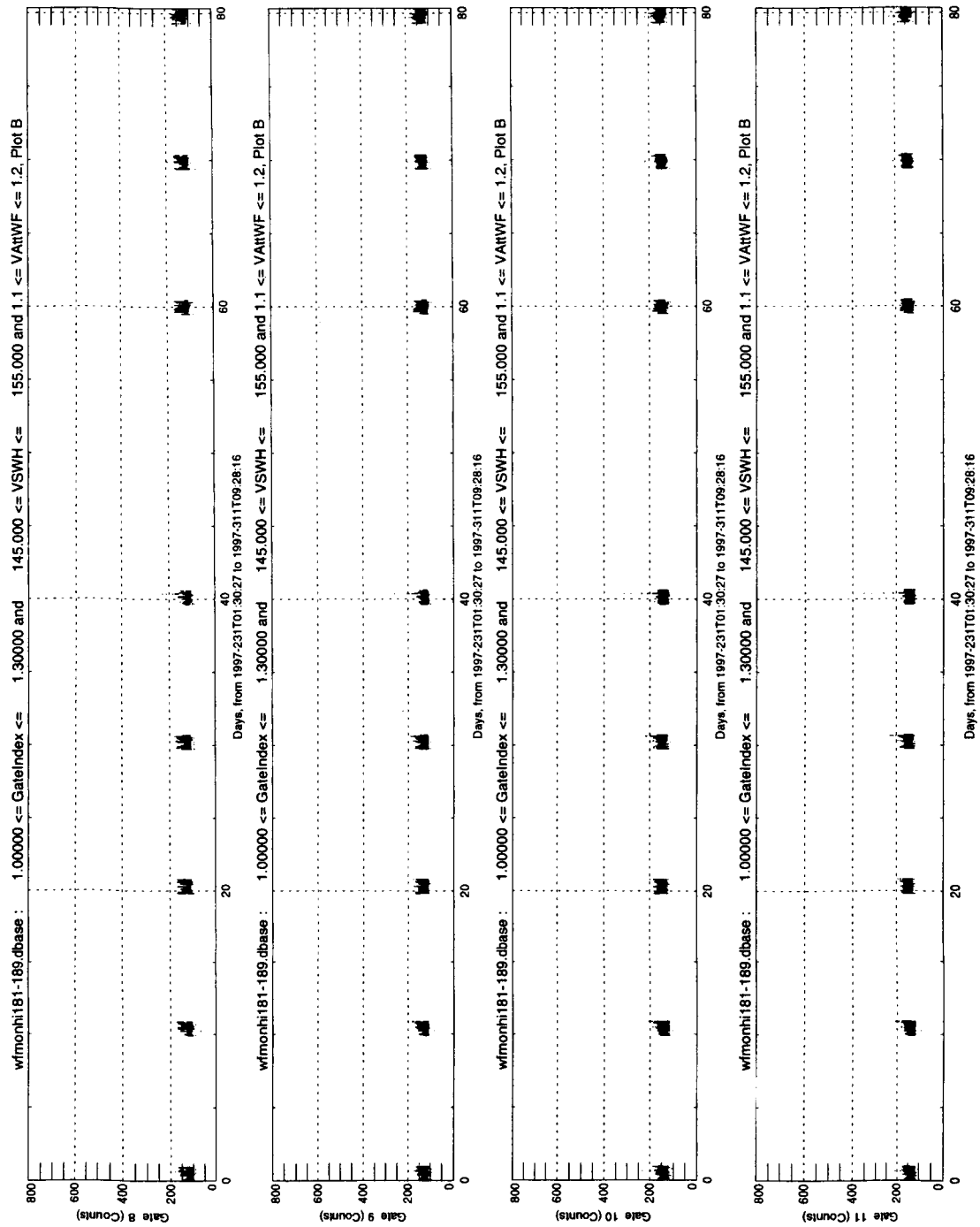


Figure A-5 SDR_WFMON_TREND Plot

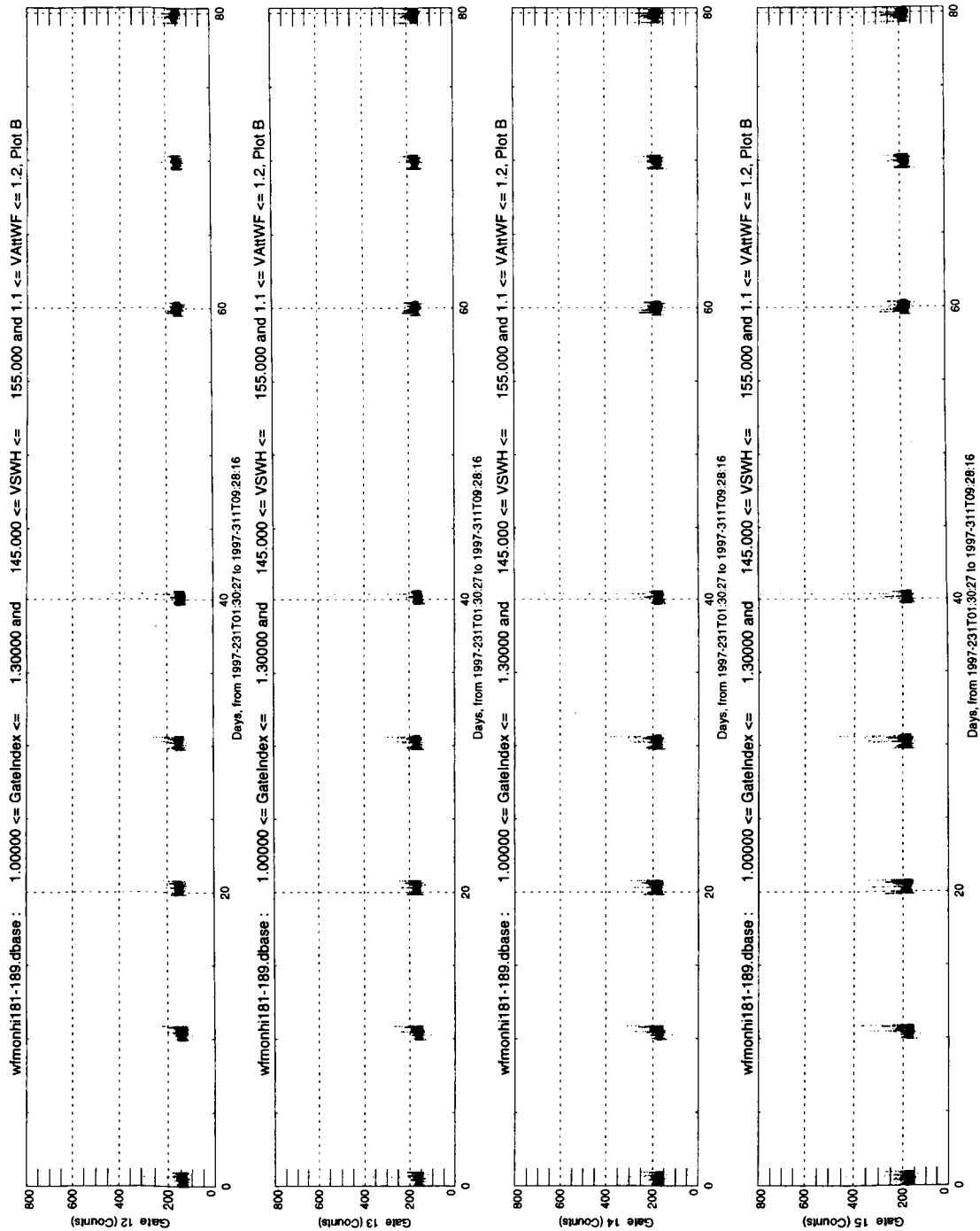


Figure A-5 SDR_WFMON_TREND Plot (Continued)

Appendix B

Software Matrix

Table B-1 SDR Software Matrix

Software	Data Source	Products	Description
dosdr	SDR Files	DB Header Events DB/QuickCAL DB/Avg ENG Avg Waveforms Avg Science Science Dump ENG Dump	Main TOPEX WFF SDR processing program. Coded in FORTRAN.
topexsdr	SCI Avgs	SDR Pass Plot (Figure A-1)	UNIX script that runs IDL topexsdr.pro.
sdrmap	SCI Database	SDR Map (special)	UNIX script that runs IDL sdrmap.pro. Creates map of entries extracted from database.
sdrscidb	SCI Database	Cycle Summary (special)	UNIX script that runs IDL sdrscidb.pro. Creates cycle summary plot.
sdrsci	SCI Avgs	SDR Science Plot (Figure A-2)	UNIX script that runs IDL sdrsci.pro. Create SDR science plot.
sdreng	Eng Avgs	SDR Engineering Plot (Figure A-3)	UNIX script that runs IDL sdreng.pro. Create SDR engineering plot.
mtopexautowf	WF Avgs	Modified WF Plots (Special)	UNIX script that runs IDL mtopexautowf.pro. Creates autoscaled waveform plots modified as requested by GSH.
mtopexwf	WF Avgs	Modified WF Plots (Special)	UNIX script that runs IDL mtopexwf.pro. Creates fix-scaled waveform plots modified as requested by GSH.
topexautowf	WF Avgs	WF Plots	UNIX script that runs IDL mtopexwf.pro.
topexwf	WF Avgs	WF Plots (Special)	UNIX script that runs IDL topexwf.pro. Creates fix-scaled waveform plots.
tpx_sdr_wfmon	WF Avgs	wfmon Trend Plots	UNIX script that runs IDL sdr_wfmon_trend

Appendix C

File & Database Contents

This appendix documents file and database formats used in SDR processing. By definition, database files will be SPACE-delimited, while average files are TAB delimited. This is subject to change under special conditions.

Table C-1 SDR Header Database Format

Field	Fmt	Units	Description
hdrid	I4	n/a	Database Link
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
rev	I5	n/a	Rev
altoper	A1	n/a	Altimeter Operating (A/B)
kuon	A3	n/a	Operating Status of Ku-Band (ON/OFF)
con	A3	n/a	Operating Status of C-Band (C32/C10/OFF)
wffdate	A9	n/a	Date Data was Processed at WFF
wffprg	A15	n/a	WFF Software Used to Process Data
wffvers	A15	n/a	Version of WFF Software Used to Process Data
sensorvers	A15	n/a	Version of DataFile.SensorDriver Used to Process Data
limitvers	A15	n/a	Version of DataFile.EALimits Used to Process Data
romvers	A15	n/a	Version of DataFile.ROMMap Used to Process Data
jplbuild	A20	n/a	JPL Version Information
jplswped	A20	n/a	JPL Version Information

Table C-2 SDR CAL Database/QuickCAL Format

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
ATB	A17	n/a	Full UTC ASCII Time
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
wffid	I2	n/a	Database Link
hdrld	I2	n/a	Database Link
step	I2	n/a	CAL Step (~16,20=CAL2)
mode	A4	n/a	Mode (CAL1/CAL2)
numrec	I4	records	Number of Records Used to Compute Averages
latitude	F6.2	degrees	Average of Latitude during CAL Interval
longitude	F6.2	degrees	Average of Longitude during CAL Interval
deltahgtku	F8.4	Δ mm	Computed Average HgtKu - Reference (TempCorr)
deltahgtc	F8.4	Δ mm	Computed Average HgtC - Reference (TempCorr)
deltaagcku	F8.4	Δ dB	Computed Average AGCKu - Reference (TempCorr)
deltaagcc	F8.4	Δ dB	Computed Average AGCC - Reference (TempCorr)
useflag	L1	n/a	Settable Flag Used for Ignoring Bad Data

Table C-3 SDR Events Database/Report Format

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
ATB	A17	n/a	Full UTC ASCII Time
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
wffid	I2	n/a	Database Link
hdrld	I2	n/a	Database Link
EventSource	A3	n/a	Source of Event (SCI/ENG)
EventClass	A6	n/a	Level of Event Severity (Danger/Warn/Status, etc.)
Description	A20	n/a	Description of Event
Value	A20	n/a	Changed Value

Table C-4 SDR ENG Database/Eng Averages Format

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
ATB	A17	n/a	Full UTC ASCII Time
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
wffid	I2	n/a	Database Link
hdrid	I2	n/a	Database Link
mode	A4	n/a	Mode
numrec	I4	records	Number of Records Used to Compute Averages
value	A4	n/a	Type of Statistic (Min/Max/Mean)
latitude	F6.2	degrees	Average of Latitude during interval
longitude	F6.2	degrees	Average of Longitude during interval
temp01	F6.2	DegC	Statistic for Temp Monitor - spare
temp02	F6.2	DegC	Statistic for AGC Receiver Section Temp
temp03	F6.2	DegC	Statistic for SSU Temp
temp04	F6.2	DegC	Statistic for Ku MTU IF Preamp Temp
temp05	F6.2	DegC	Statistic for Receiver IQ Video Section Temp
temp06	F6.2	DegC	Statistic for TWTA EPC Temp #1
temp07	F6.2	DegC	Statistic for Temp Monitor - spare
temp08	F6.2	DegC	Statistic for C MTU Cal Attenuator Temp
temp09	F6.2	DegC	Statistic for C MTU RF Preamp Temp
temp10	F6.2	DegC	Statistic for C MTU IF Preamp Temp
temp11	F6.2	DegC	Statistic for C MTU Power Monitor Temp
temp12	F6.2	DegC	Statistic for C-SSA GaAs FETS Temp
temp13	F6.2	DegC	Statistic for C-SSA Power Converter Temp
temp14	F6.2	DegC	Statistic for Ku MTU Cal Attenuator Temp
temp15	F6.2	DegC	Statistic for Ku MTU Power Monitor Temp
temp16	F6.2	DegC	Statistic for UCFM Temp
temp17	F6.2	DegC	Statistic for Ku MTU RF Preamp Temp
temp18	F6.2	DegC	Statistic for Downconverter Temp
temp19	F6.2	DegC	Statistic for Signal Proc DFB Butterfly Brd Temp

Table C-4 SDR ENG Database/Eng Averages Format (Continued)

Field	Fmt	Units	Description
temp20	F6.2	DegC	Statistic for Signal Proc DFB Memory Temp
temp21	F6.2	DegC	Statistic for Signal Proc ICA Condition Amps Temp
temp22	F6.2	DegC	Statistic for Signal Proc A/D Converter Temp
temp23	F6.2	DegC	Statistic for Signal Proc Synchronizer Temp
temp24	F6.2	DegC	Statistic for Signal Proc ATA Temp
temp25	F6.2	DegC	Statistic for Signal Proc Housing Wall Temp
temp26	F6.2	DegC	Statistic for Digital Chip Generator Gate Array Temp
temp27	F6.2	DegC	Statistic for LVPS Mounting Plate Temp
temp28	F6.2	DegC	Statistic for LVPS Boost Regulator Assembly Temp
mon01	F10.6	Volts	Statistic for LVPS +12V
mon02	F10.6	Volts	Statistic for LVPS +28V
mon03	F10.6	Volts	Statistic for LVPS +15V
mon04	F10.6	Volts	Statistic for LVPS -15V
mon05	F10.6	Volts	Statistic for LVPS +5V (5%)
mon06	F10.6	Volts	Statistic for LVPS +5V (1%)
mon07	F10.6	Volts	Statistic for LVPS-5.2V
mon08	F10.6	Volts	Statistic for LVPS -6V
mon09	F10.6	Volts	Statistic for Ku Xmit Power (TempCorr)
mon10	F10.6	Volts	Statistic for TWTA Cathode Voltage
mon11	F10.6	Amps	Statistic for TWTA Cathode Current (TempCorr)
mon12	F10.6	Amps	Statistic for TWTA Helix Current
mon13	F10.6	Amps	Statistic for TWTA Bus Current
mon14	F10.6	Watts	Statistic for C Xmit Power
mon15	F10.6	dBm	Statistic for C-SSA Input RF Power (TempCorr)
mon16	F10.6	Amps	Statistic for C-SSA Bus Current (TempCorr)
mon17	F10.6	Amps	Statistic for LVPS Bus Current
useflag	L1	n/a	Settable Flag Used for Ignoring Bad Data

Table C-5 SDR Science/Database Averages Format

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
ATB	A17	seconds	Full UTC ASCII Time
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
wffid	I2	n/a	Database Link
hdrid	I2	n/a	Database Link
Landwater	F6.4	n/a	Average of Landwater Flag
latitude	F6.2	degrees	Average of Latitude
longitude	F6.2	degrees	Average of Longitude
HgtKuRMS	F7.2	mm	RMS of AltHgtKu, computed with Hayne Method
HgtDiffRMS	F7.2	mm	RMS of AltHgtKu-C, computed with Hayne Method
AltHgtKu	F7.2	meters	Average of AltHgtKu
HgtDiff	F6.2	meters	Average of AltHgtC minus AltHgtKu
SWHKu	F6.2	meters	Average of SWHKu
SWHC	F6.2	meters	Average of SWHC
VSWHKu	F6.2	counts	Average of VSWHKu
VSWHC	F6.2	counts	Average of VSWHC
AGCKu	F5.2	dB	Average of AGCKu (TempCorr)
AGCC	F5.2	dB	Average of AGCC (Temp Corr)
HgtRate	F6.2	meters/ sec	Average of AltHgtRate
GateIndexKu	F6.2	n/a	Average of GateIndexKu
GateIndexC	F6.2	n/a	Average of GateIndexC
AttEstWF	F6.2	n/a	Average of AttEstWF
SciQuality	I4	flags	Number of ALL recs with T1016 AGC, SWH, or Hgt Flags
Interquality	I4	n/a	Number of ALL Records with InterpQuality Flag Set
LimitByte	I4	flags	Number of ALL Records with LimitByte $\neq$ 0
ModeFlag	I4	flags	Number of ALL Recs with FlgMode1068 or FlgTrack1068
OOEFlag	I4	flags	Number of ALL Records with OOEFlag set

Table C-5 SDR Science/Database Averages Format (Continued)

Field	Fmt	Units	Description
Order Flag	I4	flags	Number of ALL Records with OrderFlag set
FlgBln1016C	I4	flags	Number of ALL Heights with FlgBln1016C
FlgBln1016K	I4	flags	Number of ALL Heights with FlgBln1016Ku
FlgEaHgtC	I4	flags	Number of ALL Heights with FlgEaHgt1016C
FlgEaHgtK	I4	flags	Number of ALL Heights with FlgEaHgt1016Ku
FlgVAttKu	I4	flags	Number of GOOD Records with FlgVAttKu
FlgVAttC	I4	flags	Number of GOOD Records with FlgVAttC
UTCCnv	I4	n/a	Number of GOOD Records with UTCCnv
FlgHi5110	I4	flags	Number of GOOD Waveforms with FlgHi5110
FlgLo5110	I4	flags	Number of GOOD Waveforms with FlgLo5110
useflag	L1	n/a	Settable Flag Used for Ignoring Bad Data

Table C-6 SDR Waveform Averages Format

Field	Fmt	Units	Description
utcsec	F16.2	seconds	Average UTCSeconds
ATB	A17	n/a	Full UTC ASCII Time
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
step	I4	n/a	CAL Mode Step (Valid only if Mode=CAL1
mode	A4	n/a	Mode
numrec	I4	records	Number of Records Used to Compute Averages
gateindex	I4	n/a	Computer Gate Index Average
vsw	F14.2	counts	Computed VSWH Average
finehgt	F14.2	mm	Computed Fine Height Average
gate01	F14.2	counts	Computed WF Gate #1 Average
gate02	F14.2	counts	Computed WF Gate #2 Average
gate03	F14.2	counts	Computed WF Gate #3 Average
gate04	F14.2	counts	Computed WF Gate #4 Average
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
gate 61	F14.2	counts	Computed WF Gate #61 Average
gate62	F14.2	counts	Computed WF Gate #62 Average
gate 63	F14.2	counts	Computed WF Gate #63 Average
gate64	F14.2	counts	Computed WF Gate #64 Average

Table C-7 SDR ENG Dump Format

Field	Fmt	Units	Description
SDRRecType	I4	n/a	SDR Record Type
SDRRec	I4	n/a	SDR Record Number
UTCTime	F16.4	seconds	UTC Seconds
EngTEPoch	A24	n/a	ASCII Epoch Time
TimeRSTUTC	A24	n/a	ASCII UTC Time of Last Reset
TimeReset	F16A	seconds	Time of Last Reset
FlgEC4108	L1	n/a	FlgEC4108
FlgER4108	L1	n/a	FlgER4108
FlgES4108	L1	n/a	FlgES4108
FlgBlE4109	L1	n/a	FlgBlE4109
UTCCnvFlag	I2	n/a	UTCCnvFlag
EngChkSum	I4	n/a	EngChkSum
MemChkSum	2A2	n/a	MemChkSum(Hex)
EngOrderFlag	I4	n/a	EngOrderFlag
BadMFCount	I4	n/a	Bad Main Frame Count
CRCCount	I4	n/a	Bad CRC Count
SumCount	I4	n/a	SumCount
PassCount	I4	n/a	PassCount
BiLevel(1)	A2	n/a	Bilevel(1)
BiLevel(2)	A2	n/a	Bilevel(2)
LastCMD1	A8	n/a	Last Command #1, Type,Command,Status
LastCMD2	A8	n/a	Last Command #2, Type,Command,Status
LastCMD3	A8	n/a	Last Command #3, Type,Command,Status
LastCMD4	A8	n/a	Last Command #4, Type,Command,Status
LastCMD5	A8	n/a	Last Command #5, Type,Command,Status
LastCMD6	A8	n/a	Last Command #6, Type,Command,Status
LastCMD7	A8	n/a	Last Command #7, Type,Command,Status
LastCMD8	A8	n/a	Last Command #8, Type,Command,Status
MemAddr	2A2	n/a	Memory Dump Address (in Hex)
MemDump	32A2	n/a	Memory Dump (in Hex)

Table C-7 SDR ENG Dump Format (Continued)

Field	Fmt	Units	Description
temp01	F12.4	DegC	Temp Monitor - spare
temp02	F12.4	DegC	AGC Receiver Section Temp
temp03	F12.4	DegC	SSU Temp
temp04	F12.4	DegC	Ku MTU IF Preamp Temp
temp05	F12.4	DegC	Receiver IQ Video Section Temp
temp06	F12.4	DegC	TWTA EPC Temp #1
temp07	F12.4	DegC	Temp Monitor - spare
temp08	F12.4	DegC	C MTU Cal Attenuator Temp
temp09	F12.4	DegC	C MTU RF Preamp Temp
temp10	F12.4	DegC	C MTU IF Preamp Temp
temp11	F12.4	DegC	C MTU Powser Monitor Temp
temp12	F12.4	DegC	C-SSA GaAs FETS Temp
temp13	F12.4	DegC	C-SSA Power Converter Temp
temp14	F12.4	DegC	Ku MTU Cal Attenuator Temp
temp15	F12.4	DegC	Ku MTU Power Monitor Temp
temp16	F12.4	DegC	UCFM Temp
temp17	F12.4	DegC	Ku MTU RF Preamp Temp
temp18	F12.4	DegC	Downconverter Temp
temp19	F12.4	DegC	Signal Proc DFB Butterfly Brd Temp
temp20	F12.4	DegC	Signal Proc DFB Memory Temp
temp21	F12.4	DegC	Signal Proc ICA Condition Amps Temp
temp22	F12.4	DegC	Signal Proc A/D Converter Temp
temp23	F12.4	DegC	Signal Proc Synchronizer Temp
temp24	F12.4	DegC	Signal Proc ATA Temp
temp25	F12.4	DegC	Signal Proc Housing Wall Temp
temp26	F12.4	DegC	Digital Chip Generator Gate Array Temp
temp27	F12.4	DegC	LVPS Mounting Plate Temp
temp28	F12.4	DegC	LVPS Boost Regulator Assembly Temp
mon01	F12.4	Volts	LVPS +12V
mon02	F12.4	Volts	LVPS +28V

Table C-7 SDR ENG Dump Format (Continued)

Field	Fmt	Units	Description
mon03	F12.4	Volts	LVPS +15V
mon04	F12.4	Volts	LVPS -15V
mon05	F12.4	Volts	LVPS +5V (5%)
mon06	F12.4	Volts	LVPS +5V (1%)
mon07	F12.4	Volts	LVPS -5.2V
mon08	F12.4	Volts	LVPS -6V
mon09	F12.4	Watts	Ku Xmit Power (TempCorr)
mon10	F12.4	Volts	TWTA Cathode Voltage
mon11	F12.4	Amps	TWTA Cathode Current (TempCorr)
mon12	F12.4	Amps	TWTA Helix Current
mon13	F12.4	Amps	TWTA Bus Current
mon14	F12.4	Watts	C Xmit Power
mon15	F12.4	dBm	C-SSA Input RF Power (TempCorr)
mon16	F12.4	Amps	C-SSA Bus Current (TempCorr)
mon17	F12.4	Amps	LVPS Bus Current

Table C-8 SDR SCI Dump Format

Field	Fmt	Units	Description
SDRRecType	I4	n/a	SDRRecType
SDRRec	I4	n/a	SDRRec
FullSciTime	F16.4	seconds	FullSciTime
SciTEPoch	A24	nb/a	SciTEPoch
MFUTC	A24	n/a	MFUTC
Latitude	F12.4	degrees	Latitude
Longitude	F12.4	degrees	Longitude
SatAlt	F16.4	mm	SatAlt
timeMFD	F16.4	seconds	TimeMFD
HgtMidFr	F16.4		HgtMidFr
NetTimeTag	F12.4		NetTimeTag
TCRateCoarse	F12.4		TCRateCoarse
TCRateFine	F12.4		TCRateFine
SynchMode	I4	n/a	SynchMode
VAttWFKu	F12.4	counts	VAttWFKu
VAttWFC	F12.4	counts	VAttWFC
LastICACmd	A8	n/a	LastICACmd
LastATACmd	A8	n/a	LastATACmd
OffNadirSC	F12.4	n/a	OffNadirSC
RollSC	F12.4	n/a	RollSC
PitchSC	F12.4	n/a	PitchSC
YawSC	F12.4	n/a	YawSC
SRayPitchSTR	F12.4	n/a	SRayPitchSTR
CalAttenKu	I4	n/a	CalAttenKu
CalAttenC	I4	n/a	CalAttenC
LandWater	I2	n/a	LandWater
ModeChange	2I4	n/a	ModeChange
TestMode	I4	n/a	TestModeByte
OperMode	I4	n/a	OperModeByte
LimitByte	I4	n/a	LimitByte

Table C-8 SDR SCI Dump Format (Continued)

Field	Fmt	Units	Description
SRayTempD	I4	n/a	SRayTempDiff
BadMFCCount	I4	n/a	BadMFCCount
CRCCCount	I4	n/a	BadCRCCCount
OrderFlag	I4	n/a	OrderFlag
OOEFlag	I4	n/a	OOEFlag
UTCCConvFlag	I4	n/a	UTCCConvFlag
IntQualFlag	I4	n/a	InterpQualFlag
Mode	2A4	n/a	Mode
Track	2A4	n/a	Track
AGCType	2A4	n/a	AGCType
AltOper	A1	n/a	AltOper
KuOn	A3	n/a	KuOn
COon	A3	n/a	COon
WFFreqHi	A2	n/a	WFFreqHi
WFFreqLo	A2	n/a	WQFFreqLo
GateIndxKu	I4	n/a	GateIndxKu
GateIndxC	I4	n/a	GateIndxC
Mode1068	L1	n/a	FlgMode1068
Hgt1016Ku	L1	n/a	FlgHgt1016Ku
AGC1016K	L1	n/a	FlgAGC1016Ku
SWH1016K	L1	n/a	FlgSWH1016Ku
HgtRate1016	L1	n/a	FlgHgtRate1016
TempLo1016	L1	n/a	FlgTempLo1016
FlgTrack1068	L1	n/a	FlgTrack1068
FlgHgt1016C	L1	n/a	FlgHgt1016C
FlgAGC1016C	L1	n/a	FlgAGC1016C
SWH1016C	L1	seconds	FlgSWH1016C
FlgAtt1016	L1	n/a	FlgAtt1016
TempHi1016	L1	n/a	FlgTempHi1016
FlgSC4108	L1	n/a	FlgSC4108

Table C-8 SDR SCI Dump Format (Continued)

Field	Fmt	Units	Description
FlgSM4108	L1	n/a	FlgSM4108
FlgSS4108	L1	n/a	FlgSS4108
NoCorr1165	L1	n/a	FlgNoCorr1165
VAttWF5135K	L1	n/a	FlagVAttWF5135Ku
VAttWF5135C	L1	n/a	FlgVAttWF5135C,TAB
AltHgtKu	F16.4	mm	AltHgtKu
FlgBln1016Ku	L1	n/a	FlgBln1016Ku
EaHgt1016Ku	L1	n/a	FlgEaHgt1016Ku
AltHgtC	F16.4	mm	AltHgtC
FlgBln1016C	L1	n/a	FlgBln1016C
EaHgt1016C	L1	n/a	FlgEaHgt1016C
AltHgtRate	F12.4	mm/sec	AltHgtRate
AGCKu	F12.4	dB	AGCKu
AGCC	F12.4	dB	AGCC
VSWHKu	F12.4	counts	VSWHKu
SWHKu	F12.4	m	SWHKu
VSWHC	F12.4	counts	VSWHC
SWHC	F12.4	m	SWHC
SatAltHiRate	F16.4	mm	SatAltHiRate

Table C-9 Track-Mode Waveform Averages Format

Field	Fmt	Units	Description
utcsec	F16.2	seconds	Average UTCSeconds
ATB	A17	n/a	Full UTC ASCII Time
cycle	I3	n/a	Cycle
pass	I3	n/a	Pass
mode	A4	n/a	Mode
numrec	I4	records	Number of Records Used to Compute Averages
latitude	F14.2	degrees	Computed Latitude Averages
longitude	F14.2	degrees	Computed Longitude Averages
gateindex	I4	n/a	Computed Gate Index Average
vsw	F14.2	counts	Computed VSWH Average
finehgt	F14.2	mm	Computed Fine Height Average
vatt	F14.2	ratio	Computed Vatt Average
hgtrate	F14.2	m/sec	Computed AltHgtRate Average
AGC	F14.2	dB	Computed AGC (TempCor) Average
gate01	F14.2	counts	Computed WF Gate #1 Average
gate02	F14.2	counts	Computed WF Gate #2 Average
gate03	F14.2	counts	Computed WF Gate #3 Average
gate04	F14.2	counts	Computed WF Gate #4 Average
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
gate 61	F14.2	counts	Computed WF Gate #61 Average
gate62	F14.2	counts	Computed WF Gate #62 Average
gate 63	F14.2	counts	Computed WF Gate #63 Average
gate64	F14.2	counts	Computed WF Gate #64 Average

Appendix D

Plots of Reference Values

This appendix contains plots of the reference values used during SDR processing. These plots were generated by an IDL program that reads DataFile.EALimits and extracts from it the CAL references.

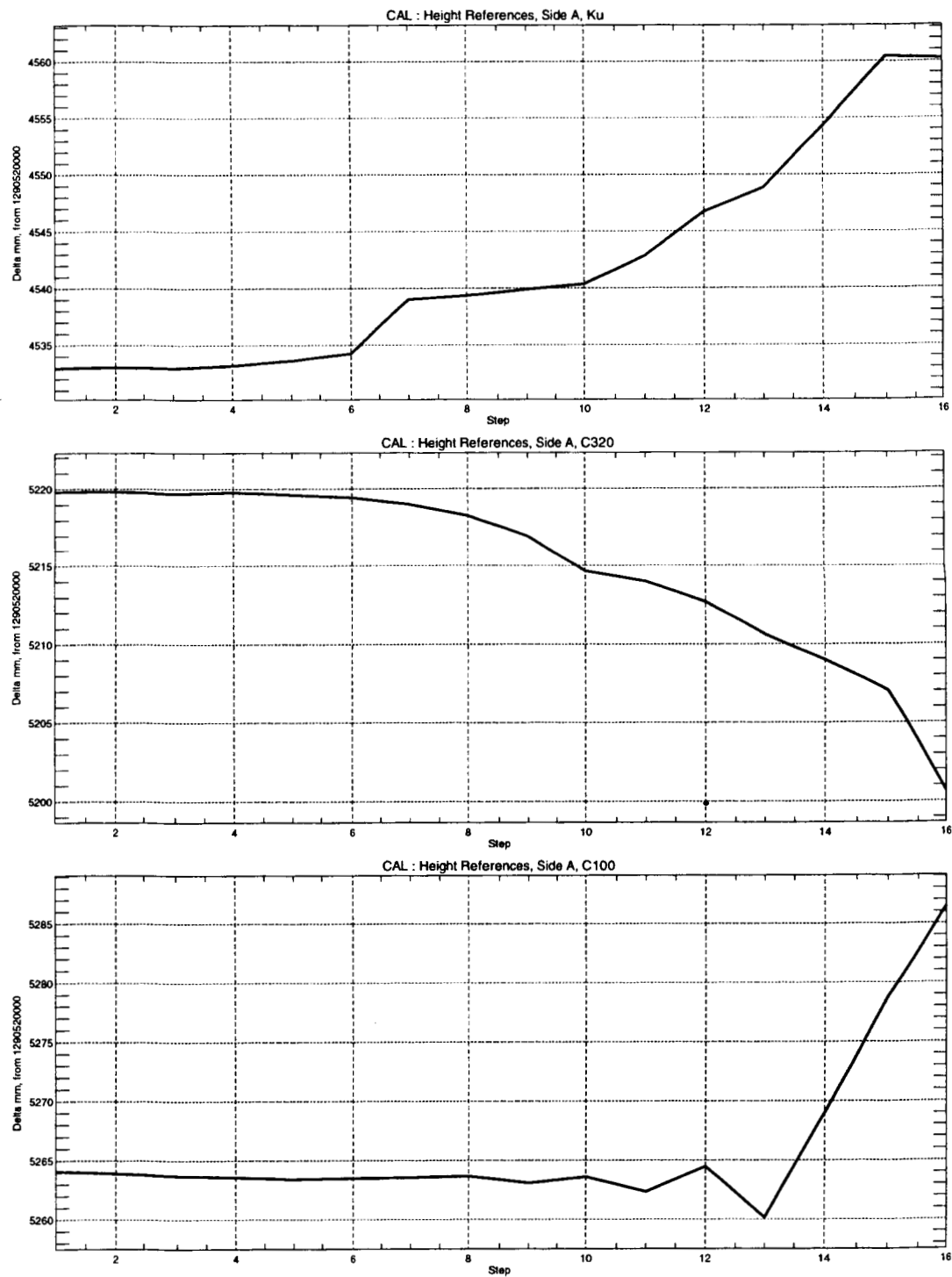


Figure D-1 CAL Height References, Side A

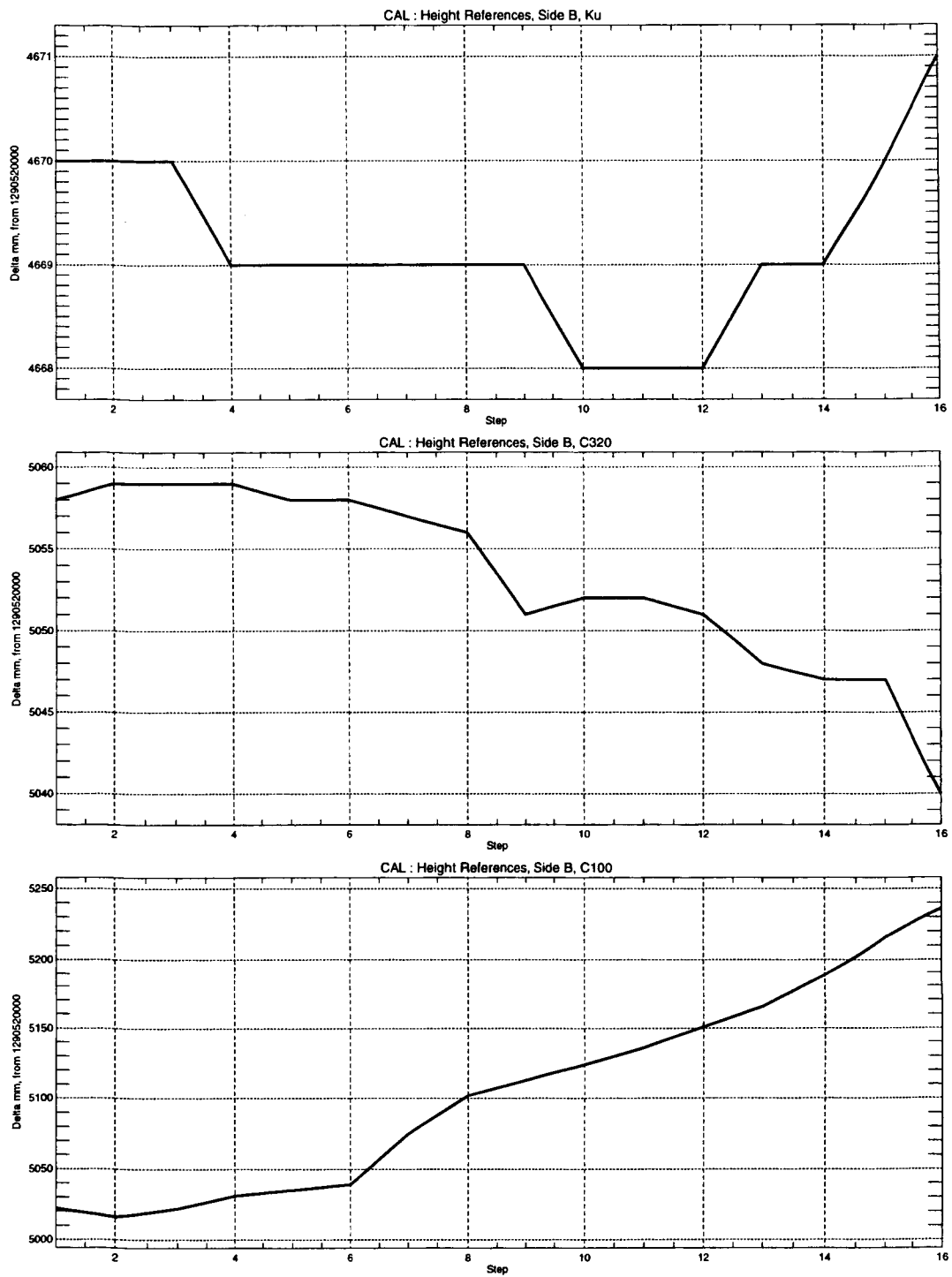


Figure D-2 CAL Height References, Side B

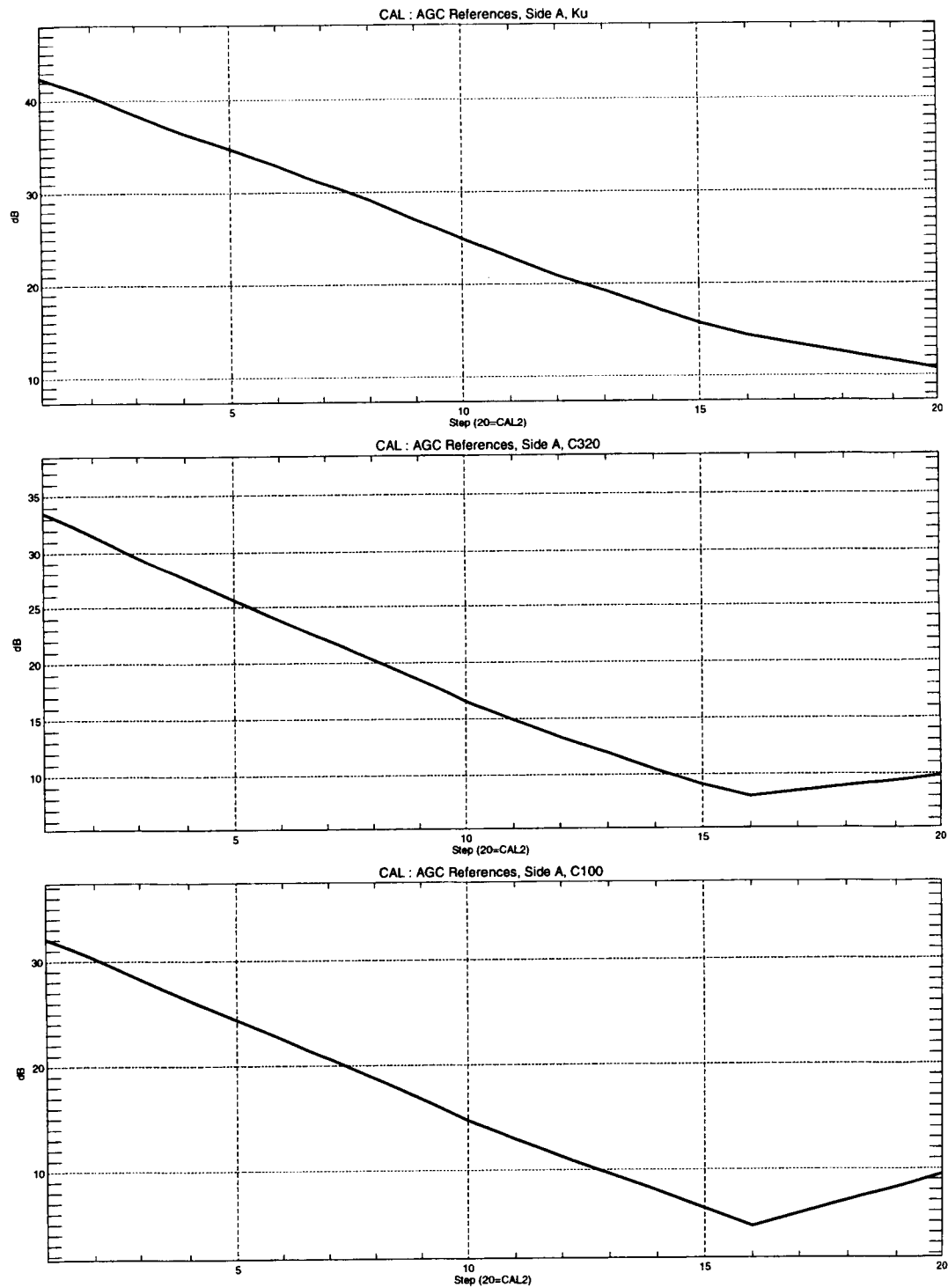


Figure D-3 CAL AGC References, Side A

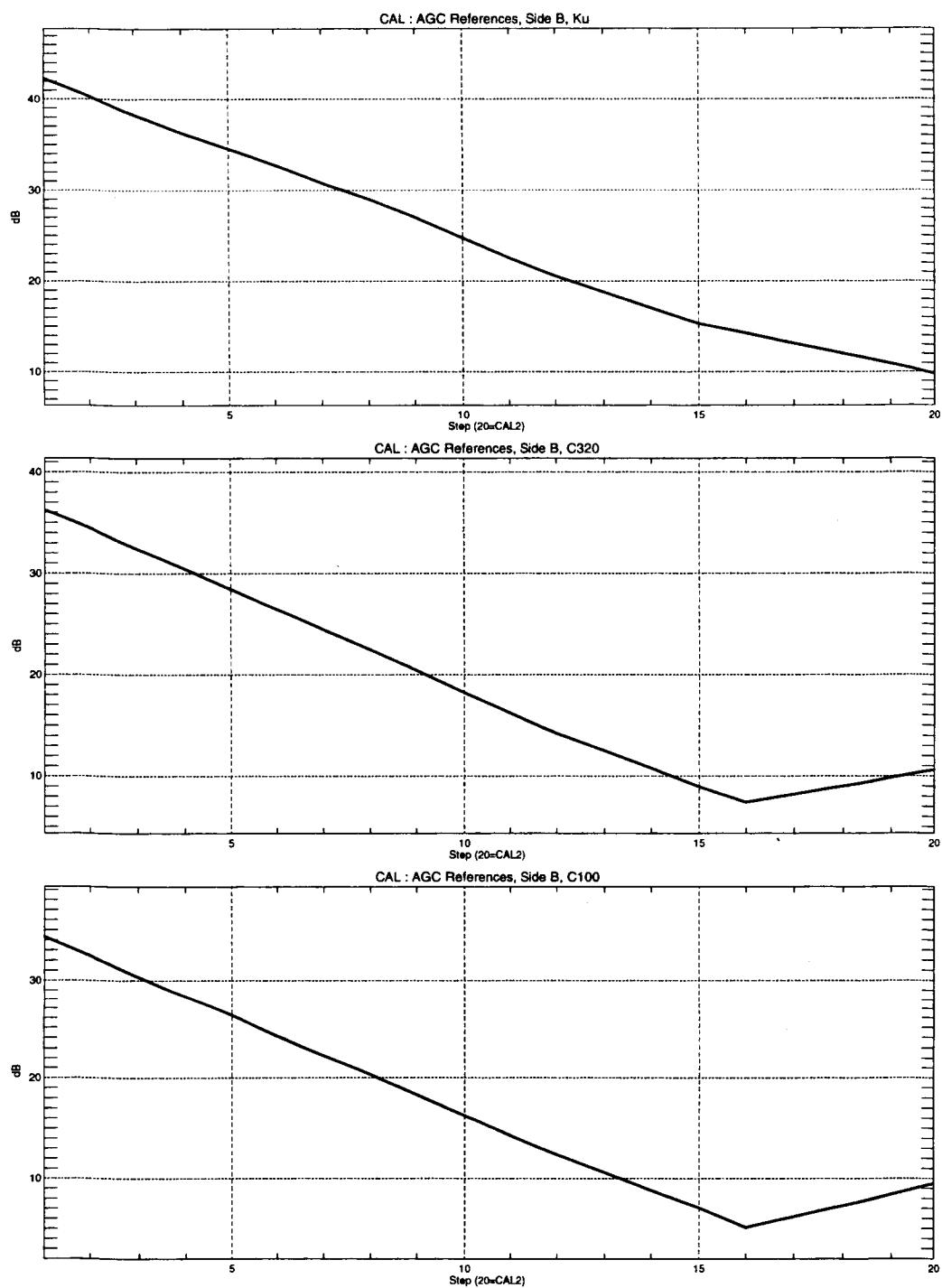


Figure D-4 CAL AGC References, Side B

Appendix E

Attachments

Table E-1 Attachments

Date	Author	Subject
July 16, 1993	Ron Brooks	Implementation of 100 mm C-Band Range Calibration Correction in the WFF TOPEX Processing
October 1, 1993	Hayden Gordon	Change Control Status for SDR Processing Module
October 1, 1993	Dennis Lockwood, Jeff Lee	SDR Processing
October 13, 1993	Hayden Gordon	Change to SDR Processing Module
May 6, 1994	Dennis Lockwood, Jeff Lee	Request 94/043, EA S/W Chg. 12
May 29, 1994	Hayden Gordon	EA S/W Chg 12: 100 mm C-Band Range Calibration Corrections

To: Hayden Gordon

From: Ron Brooks *RB*

Date: July 16, 1993

Subject: Implementation of 100 mm C-Band Range Calibration
Correction in the WFF TOPEX Processing

In algorithm S1041:Calibration Correction to Height, JPL adds a
+100 mm calibration correction to C-Band heights.

For consistency with the JPL processing, it is recommended that
this calibration correction be implemented in the Wallops
processing.

cc:

David Hancock

Ron Forsythe

George Hayne

TOPEX InterOffice Memo

To: Ron Brooks, Ron Forsythe, George Hayne, David Hancock
From: Hayden Gordon
Date: October 1, 1993
Subject: Change Control Status for SDR Processing Module

By this memo, the NASA Radar Altimeter Sensor Data Record (SDR) processing module is considered baselined and is placed under change control; changes to any of its routines will be handled according to the TOPEX Software Development Team (SWDT) change control policy (stated below).

Attached is a summary of the functions performed by the module, the database structures, a sample of the standard products generated, and a list of the source code and data files affected.

SWDT Change Control Policy

Any changes to SWDT baselined software, under change control, will be handled according to the following process:

1. A memo describing the requested change will be generated and circulated to all members of the TOPEX Algorithm Development Team (ADT), and to the SWDT (for implementation comments).
 2. The memo will be discussed at a meeting (regular or special) of the ADT, at which time any special implementation comments (from the SWDT) will be considered. If the change is approved by the ADT, a priority will be assigned. The process will not proceed beyond this step until ADT approval is secured.
 3. An SWDT Work Request will be generated, signed by the NASA SWDT manager, and attached as a cover to the original memo.
 4. The SWDT request will be given a title, EA S/W Chg #, and processed in the normal manner.
 5. When the request is completed, a brief memo will be generated by the SWDT to summarize the change, to date the change (the date when implemented and the date when the change will appear in the data), and to list the affected routines and data files. Any new or modified products will be attached, if applicable. The implementation memo will be delivered to all members of the ADT, and the process will be complete.
-

CC: Jeff Lee, Dennis Lockwood, Carol Purdy



Software Development Team
TOPEX Project
NASA GSFC/WFF

To: CSC/Hayden Gordon
From: CSC/Dennis Rockwood, CSC/Jeff Lee
Date: October 01, 1993
Subject: SDR Processing.

Attached are listing of the database structures and sample output products from the Sensor Data Record processing. The processing methodology, database structure, processing software, and plotting software is hereby under change control. No modifications, additions, or deletions will be made to this system without the proper (TBD) authorization.

Processing Methodology.

1. Data is received from JPL on Exabyte tape.
2. Tapes are being copied and sent to Jay Zwally.
3. As of 05/26/93, no further processing is being done. Databases are no longer being loaded and SDR pass plots are no longer being generated. Databases containing data from Cycles 1 to 22 are being stored.

Attached are listing of the database structures and sample output products. Attachment A contains the structure of the databases. Attachment B contains sample of the per-pass products. Attachment C contains samples of the per-cycle products. Appendix D is a list of software and datafile titles put under change control by this (or some previous) memo.

TOPEX InterOffice Memo

To: Ron Brooks, Ron Forsythe, George Hayne, David Hancock
From: Hayden Gordon
Date: October 13, 1993
Subject: Change to SDR Processing Module

Attached is a memo from Ron Brooks which will necessitate a change in the baselined SDR processing module. Please consider the request, provide written comments if desired, and we will discuss it for possible implementation at the next ADT meeting.

Thanks,

CC: Jeff Lee, Dennis Lockwood, Carol Purdy



Software Development Team
TOPEX Project
NASA GSFC/WMF

To: CSC/Hayden Gordon
From: CSC/Dennis Lockwood, CSC/Jeff Dee
Date: May 6, 1994
Subject: RE> Request 94/043, EA S/W Chg 12.

In response to Request#94/043, EA S/W Chg 12, Calibration Corrections, no Range, AGC, or SWH calibration corrections are used in the SDR processor because no JPL Correction-computing algorithms are coded at WMF. The only place any algorithms are used during SDR processing is in the creation of a WMF I/GDR. Algorithms used for the WMF I/GDR creation are documented in WMF TOPEX Software Documentation Volume 2 - SDR Processing, May 1994.

TOPEX InterOffice Memo

To: Ron Brooks, Ron Forsythe, George Hayne, David Hancock, Craig Purdy
From: Hayden Gordon
Date: May 29, 1994
Subject: EA S/W Chg 12: 100mm C-Band Range Calibration Corrections

Attached is a memo from Ron Brooks which would have necessitated a change in the baselined SDR processing module, to implement the 100 mm C-Band calibration correction to range (height), for consistency with the JPL standard processing. This change, designated Engineering Assessment Software Change Request 12, has been finished as described in the attached memo. It was decided to take no action on implementing any of the calibration corrections (Range, AGC, or SWH) at this time. Please attach the memo dated May 6, 1994 (distributed with this package) to your SDR processing description, by which the SDR software was put under Change Control (i.e. "Change control Status for SDR Processing Module", October 1, 1993).

Thanks,

CC: Jeff Lee, Dennis Lockwood, Carol Purdy

Attachment A: Database Structures

Structure for database: Databases:TOPEX SDR Databases:header.dbf

Number of data records: 4681

Date of last update: 05/26/93

Field	Field Name	Type	Width	Dec
1	hdrid	Numeric	4	
2	cycle	Numeric	3	
3	pass	Numeric	3	
4	revnum	Numeric	5	
5	altoper	Character	1	
6	kuon	Character	3	
7	con	Character	3	
8	wffdate	Character	9	
9	wffname	Character	15	
10	wffvers	Character	15	
11	sensorvers	Character	15	
12	limitvers	Character	15	
13	romvers	Character	15	
14	jplbuild	Character	20	
15	jplswped	Character	20	
**	Total **		147	

Structure for database: Databases:TOPEX SDR Databases:event.dbf

Number of data records: 10295

Date of last update: 05/26/93

Field	Field Name	Type	Width	Dec
1	utcsec	Numeric	13	2
2	utcatb	Character	17	
3	cycle	Numeric	3	
4	pass	Numeric	3	
5	wffid	Numeric	2	
6	hdrid	Numeric	2	
7	source	Character	3	
8	type	Character	6	
9	descript	Character	20	
10	value	Character	20	
.. Total ..			90	

Structure for database: Databases:TOPEX SDR Databases:science.dbf

Number of data records: 181665

Date of last update: 05/26/93

Field	Field Name	Type	Width	Dec
1	utcsec	Numeric	13	2
2	utcatb	Character	17	
3	cycle	Numeric	3	
4	pass	Numeric	3	
5	wffid	Numeric	2	
6	hdrid	Numeric	2	
7	numrec	Numeric	4	
8	worstmode	Character	4	
9	bestmode	Character	4	
10	landwater	Numeric	6	4
11	latitude	Numeric	7	3
12	longitude	Numeric	7	3
13	hgtkurms	Numeric	9	2
14	hgtrms	Numeric	9	2
15	ssh	Numeric	9	2
16	hgtdiff	Numeric	6	2
17	swhku	Numeric	6	2
18	swhc	Numeric	6	2
19	vswhku	Numeric	6	2
20	vswhc	Numeric	6	2
21	agcku	Numeric	5	2
22	agcc	Numeric	5	2
23	hgtrate	Numeric	6	2
24	gateku	Numeric	5	3
25	gatec	Numeric	5	3
26	attestwf	Numeric	6	2
27	sciquality	Numeric	4	
28	intpqual	Numeric	4	
29	limitbyte	Numeric	4	
30	modeflag	Numeric	4	
31	coeflag	Numeric	4	
32	orderflag	Numeric	4	
33	bln1016c	Numeric	4	
34	bln1016ku	Numeric	4	
35	eal016c	Numeric	4	
36	eal016ku	Numeric	4	
37	flgvattku	Numeric	4	
38	flgvattc	Numeric	4	
39	utccconv	Numeric	4	
40	hi5110	Numeric	4	
41	lo5110	Numeric	4	
42	useflag	Logical	1	

.. Total ..

223

Structure for database: Databases:TOPEX SDR Databases:cal.dbf

Number of data records: 7026

Date of last update: 05/26/93

Field	Field Name	Type	Width	Dec
1	utcsec	Numeric	13	2
2	utcatb	Character	17	
3	cycle	Numeric	3	
4	pass	Numeric	3	
5	wffid	Numeric	2	
6	hdrid	Numeric	2	
7	step	Numeric	2	
8	mode	Character	4	
9	numrec	Numeric	4	
10	latitude	Numeric	6	2
11	longitude	Numeric	6	2
12	deltahgtku	Numeric	8	4
13	deltahgtc	Numeric	8	4
14	deltaagcku	Numeric	8	4
15	deltaagcc	Numeric	8	4
16	useflag	Logical	1	
** Total **			96	

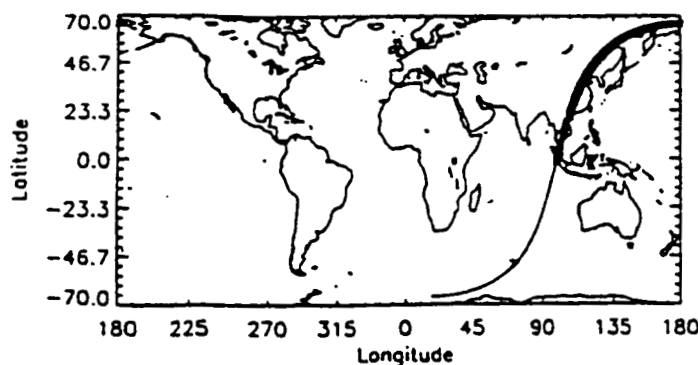
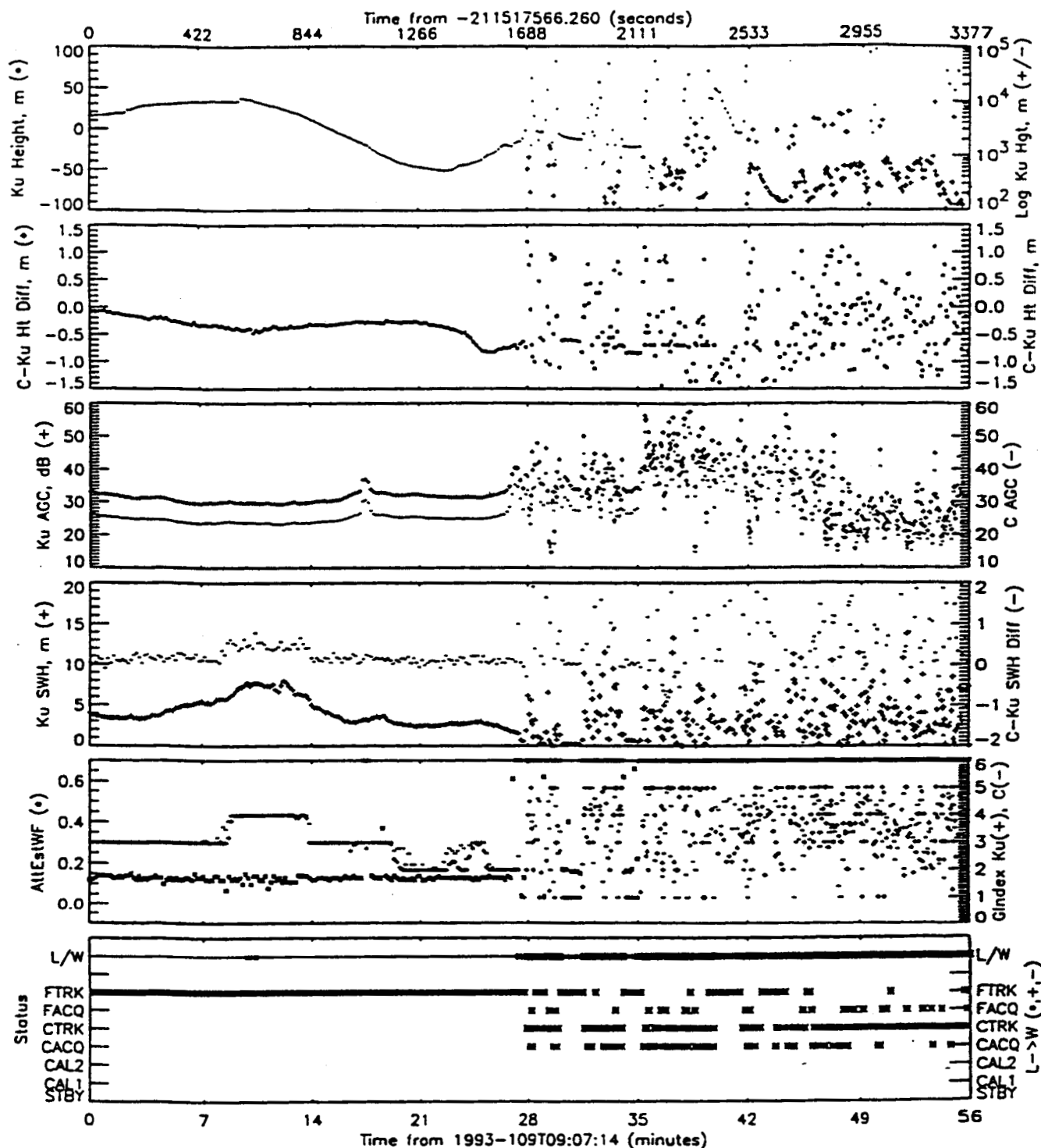
Structure for database: Databases:TOPEX SDR Databases:engin.dbf

Number of data records: 16305

Date of last update: 05/26/93

Field	Field Name	Type	Width	Dec
1	utcsec	Numeric	13	2
2	utcatb	Character	17	
3	cycle	Numeric	3	
4	pass	Numeric	3	
5	wffid	Numeric	2	
6	hdrid	Numeric	2	
7	mode	Character	4	
8	numrec	Numeric	4	
9	value	Character	4	
10	latitude	Numeric	7	3
11	longitude	Numeric	7	3
12	temp01	Numeric	6	2
13	temp02	Numeric	6	2
14	temp03	Numeric	6	2
15	temp04	Numeric	6	2
16	temp05	Numeric	6	2
17	temp06	Numeric	6	2
18	temp07	Numeric	6	2
19	temp08	Numeric	6	2
20	temp09	Numeric	6	2
21	temp10	Numeric	6	2
22	temp11	Numeric	6	2
23	temp12	Numeric	6	2
24	temp13	Numeric	6	2
25	temp14	Numeric	6	2
26	temp15	Numeric	6	2
27	temp16	Numeric	6	2
28	temp17	Numeric	6	2
29	temp18	Numeric	6	2
30	temp19	Numeric	6	2
31	temp20	Numeric	6	2
32	temp21	Numeric	6	2
33	temp22	Numeric	6	2
34	temp23	Numeric	6	2
35	temp24	Numeric	6	2
36	temp25	Numeric	6	2
37	temp26	Numeric	6	2
38	temp27	Numeric	6	2
39	temp28	Numeric	6	2
40	mon01	Numeric	10	6
41	mon02	Numeric	10	6
42	mon03	Numeric	10	6
43	mon04	Numeric	10	6
44	mon05	Numeric	10	6
45	mon06	Numeric	10	6
46	mon07	Numeric	10	6
47	mon08	Numeric	10	6
48	mon09	Numeric	10	6
49	mon10	Numeric	10	6
50	mon11	Numeric	10	6
51	mon12	Numeric	10	6
52	mon13	Numeric	10	6
53	mon14	Numeric	10	6
54	mon15	Numeric	10	6
55	mon16	Numeric	10	6
56	mon17	Numeric	10	6
57	useflag	Logical	1	
..	Total ..		406	

Attachment B: Samples of Per-Pass Products



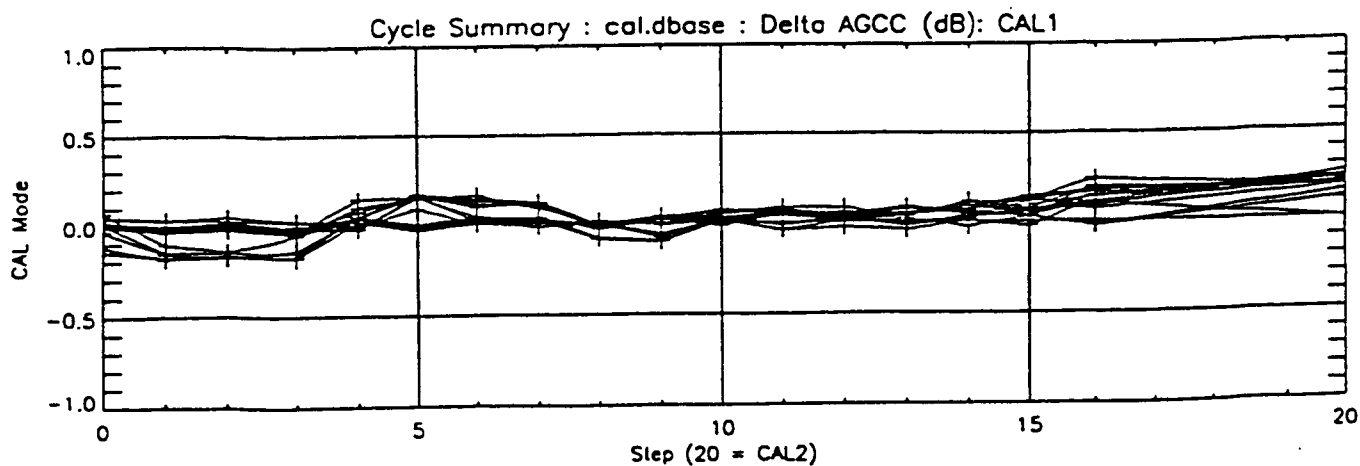
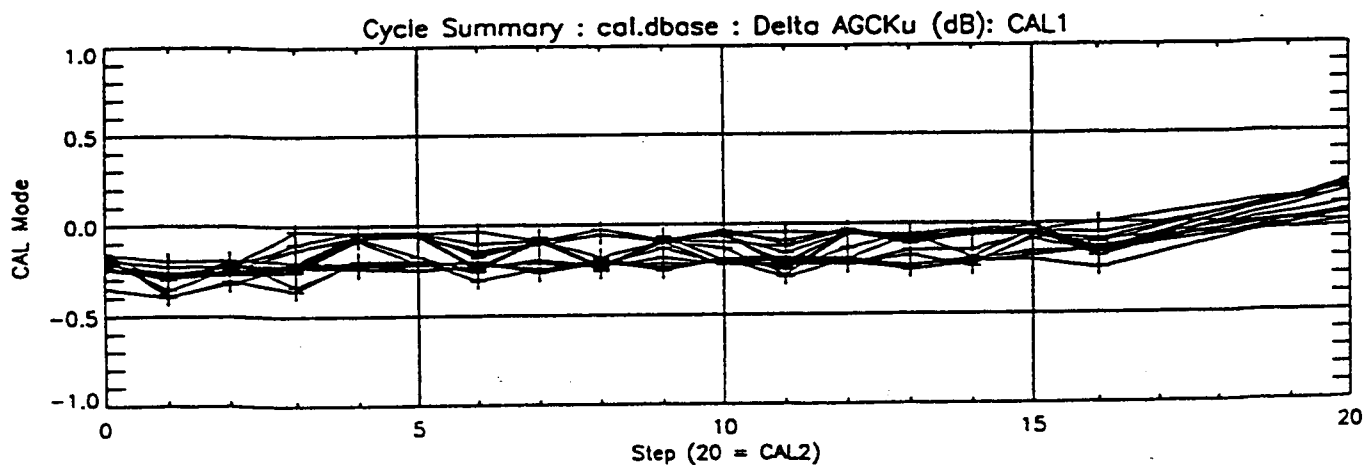
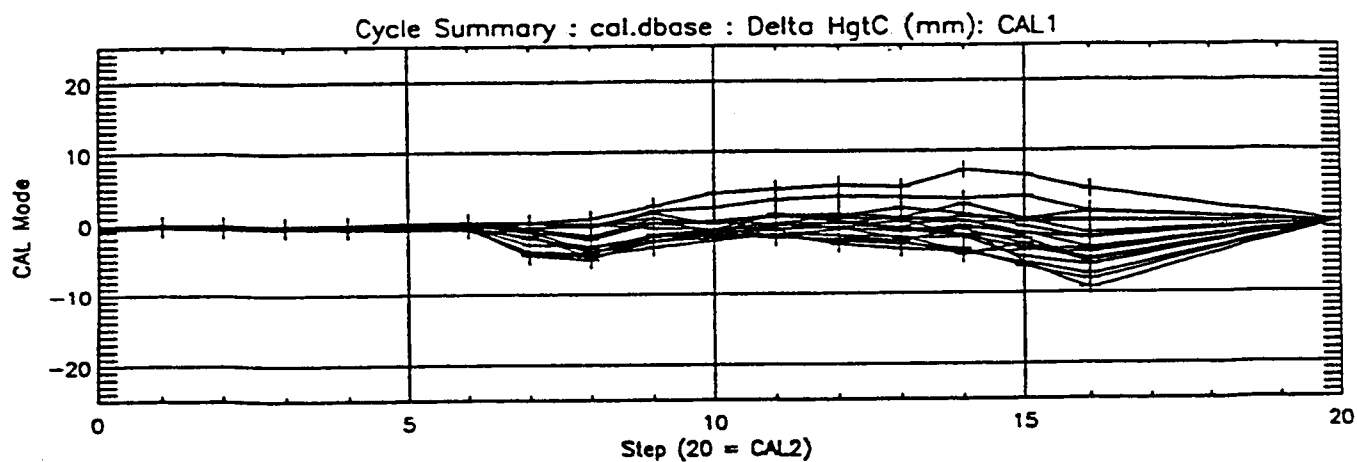
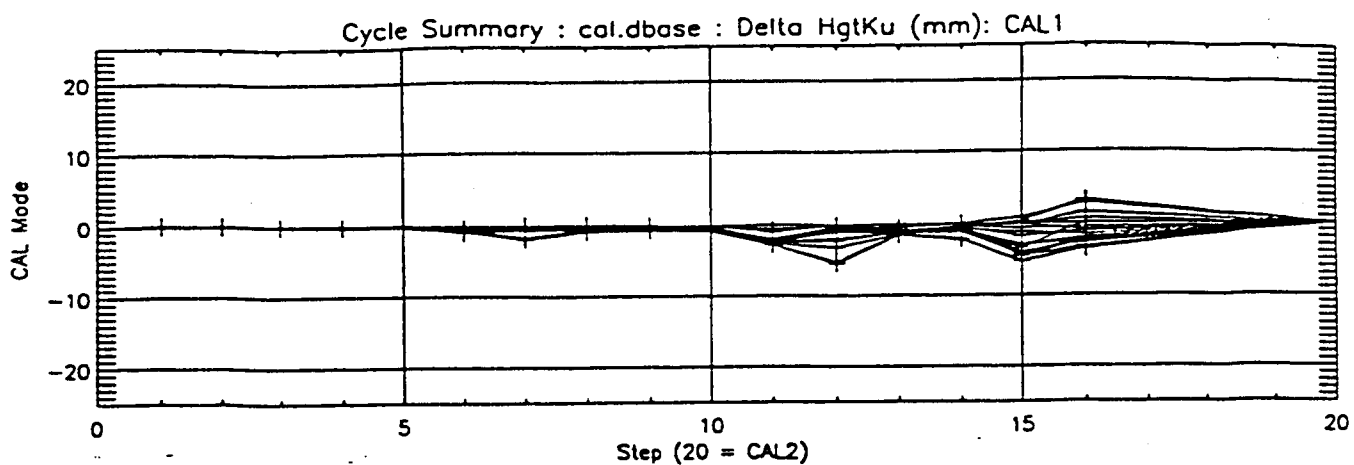
CYCLE 22, PASS 1

Input File: sdr_sci_022_001.std
 NumRec = 474, Interval = 10
 Summary created Tue May 25 19:07:04 1993
 SDR Software = Version 3.0, 01/14/93
 SensorVersion = Version 13, 05/11/93
 EALimVersion = Version 05, 01/19/93
 ROMMapVersion = Version 1.2, 11/30/92
 SIS_ID = 633-751-23-001/1992-05-15 ;
 ALT_SDR_SW_PED = 633-755/1992-11-25 ;

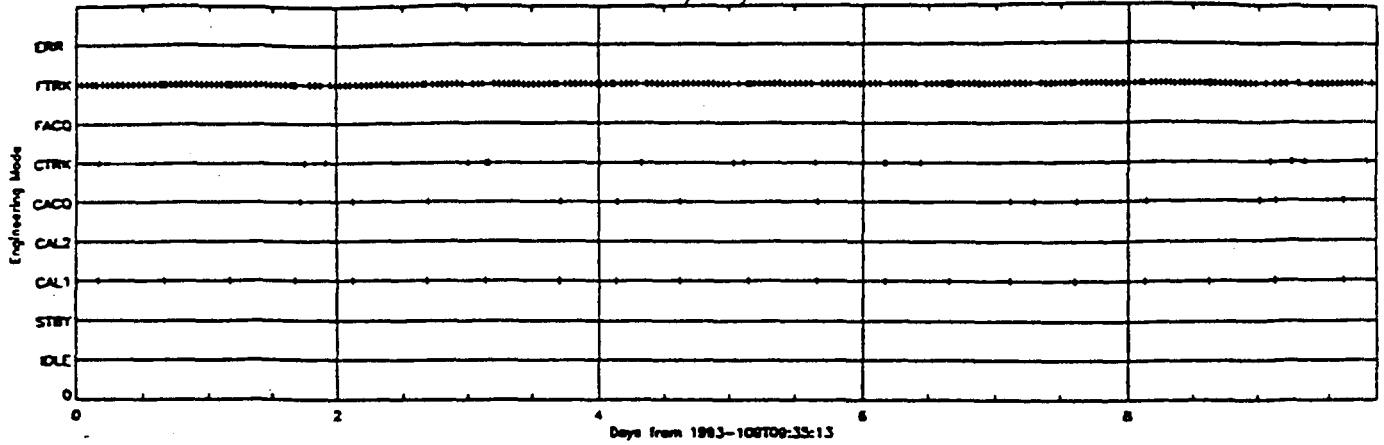
Attachment C: Samples of Per-Cycle Products

TOPEX Engineering Assessment SDR Report

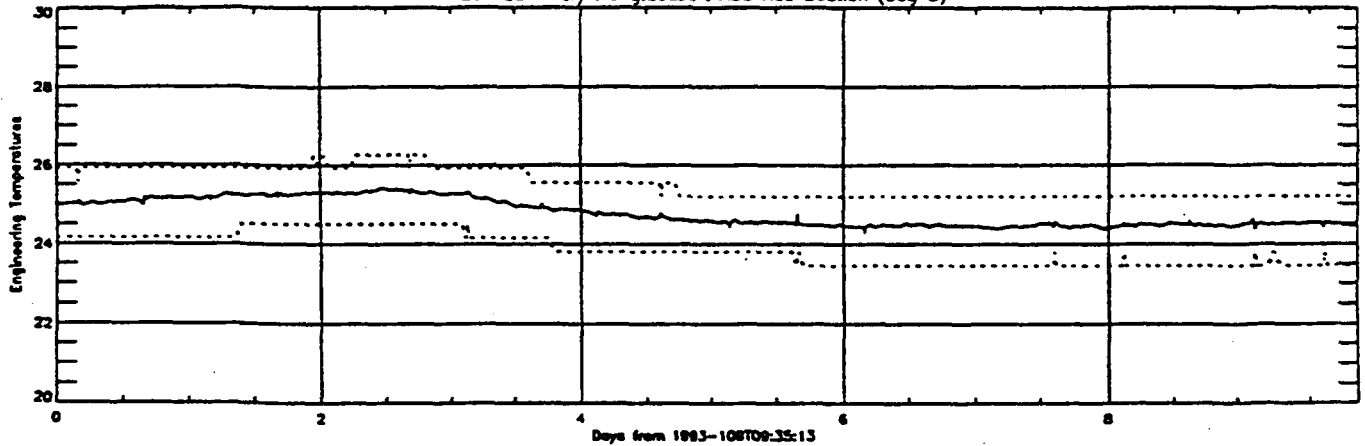
<u>Cycle</u>	<u>Pass</u>	<u>Rev</u>	<u>Hdr</u>	<u>Alt State</u>	<u>Date Proc</u>
22	209	3324	1	Alt-A, Ku-ON, C-C32	05/25/93
22	210	3325	1	Alt-A, Ku-ON, C-C32	05/25/93
22	211	3325	1	Alt-A, Ku-ON, C-C32	05/25/93
22	212	3326	1	Alt-A, Ku-ON, C-C32	05/25/93
22	213	3326	1	Alt-A, Ku-ON, C-C32	05/25/93
22	214	3327	1	Alt-A, Ku-ON, C-C32	05/25/93
22	215	3327	1	Alt-A, Ku-ON, C-C32	05/25/93
22	216	3328	1	Alt-A, Ku-ON, C-C32	05/25/93
22	217	3328	1	Alt-A, Ku-ON, C-C32	05/25/93
22	218	3329	1	Alt-A, Ku-ON, C-C32	05/25/93
22	219	3329	1	Alt-A, Ku-ON, C-C32	05/25/93
22	220	3330	1	Alt-A, Ku-ON, C-C32	05/25/93
22	221	3330	1	Alt-A, Ku-ON, C-C32	05/25/93
22	222	3331	1	Alt-A, Ku-ON, C-C32	05/25/93
22	223	3331	1	Alt-A, Ku-ON, C-C32	05/25/93
22	224	3332	1	Alt-A, Ku-ON, C-C32	05/25/93
22	225	3332	1	Alt-A, Ku-ON, C-C32	05/25/93
22	226	3333	1	Alt-A, Ku-ON, C-C32	05/25/93
22	227	3333	1	Alt-A, Ku-ON, C-C32	05/25/93
22	228	3334	1	Alt-A, Ku-ON, C-C32	05/25/93
22	229	3334	1	Alt-A, Ku-ON, C-C32	05/25/93
22	230	3335	1	Alt-A, Ku-ON, C-C32	05/25/93
22	231	3335	1	Alt-A, Ku-ON, C-C32	05/25/93
22	232	3336	1	Alt-A, Ku-ON, C-C32	05/25/93
22	233	3336	1	Alt-A, Ku-ON, C-C32	05/25/93
22	234	3337	1	Alt-A, Ku-ON, C-C32	05/25/93
22	235	3337	1	Alt-A, Ku-ON, C-C32	05/25/93
22	236	3338	1	Alt-A, Ku-ON, C-C32	05/25/93
22	237	3338	1	Alt-A, Ku-ON, C-C32	05/25/93
22	238	3339	1	Alt-A, Ku-ON, C-C32	05/25/93
22	239	3339	1	Alt-A, Ku-ON, C-C32	05/25/93
22	240	3340	1	Alt-A, Ku-ON, C-C32	05/25/93
22	241	3340	1	Alt-A, Ku-ON, C-C32	05/25/93
22	242	3341	1	Alt-A, Ku-ON, C-C32	05/25/93
22	243	3341	1	Alt-A, Ku-ON, C-C32	05/25/93
22	244	3342	1	Alt-A, Ku-ON, C-C32	05/25/93
22	245	3342	1	Alt-A, Ku-ON, C-C32	05/25/93
22	246	3343	1	Alt-A, Ku-ON, C-C32	05/25/93
22	247	3343	1	Alt-A, Ku-ON, C-C32	05/25/93
22	248	3344	1	Alt-A, Ku-ON, C-C32	05/25/93
22	249	3344	1	Alt-A, Ku-ON, C-C32	05/25/93
22	250	3345	1	Alt-A, Ku-ON, C-C32	05/25/93
22	251	3345	1	Alt-A, Ku-ON, C-C32	05/25/93
22	252	3346	1	Alt-A, Ku-ON, C-C32	05/25/93
22	253	3346	1	Alt-A, Ku-ON, C-C32	05/25/93
22	254	3347	1	Alt-A, Ku-ON, C-C32	05/25/93



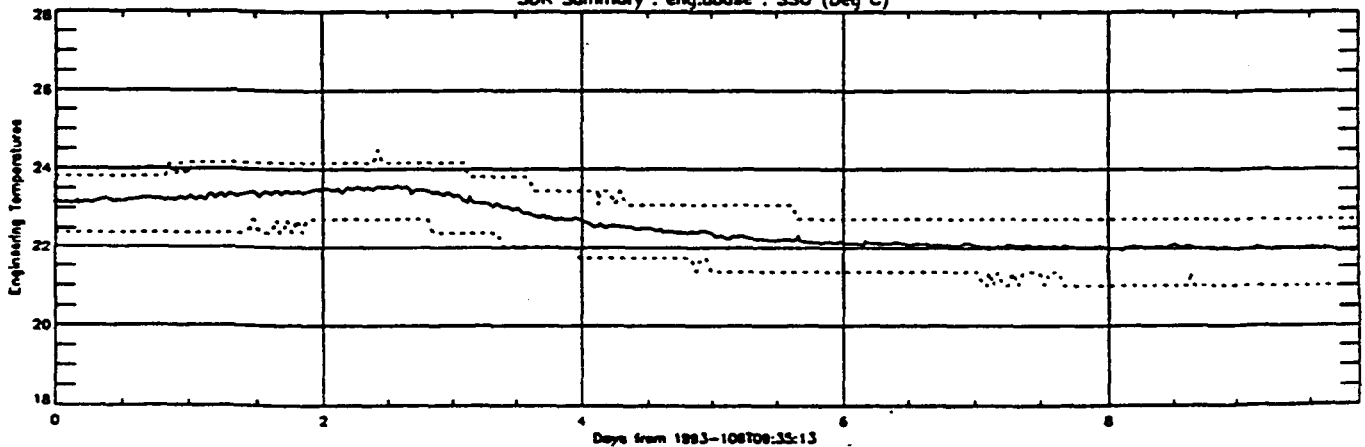
SDR Summary : eng.dbase : Mode



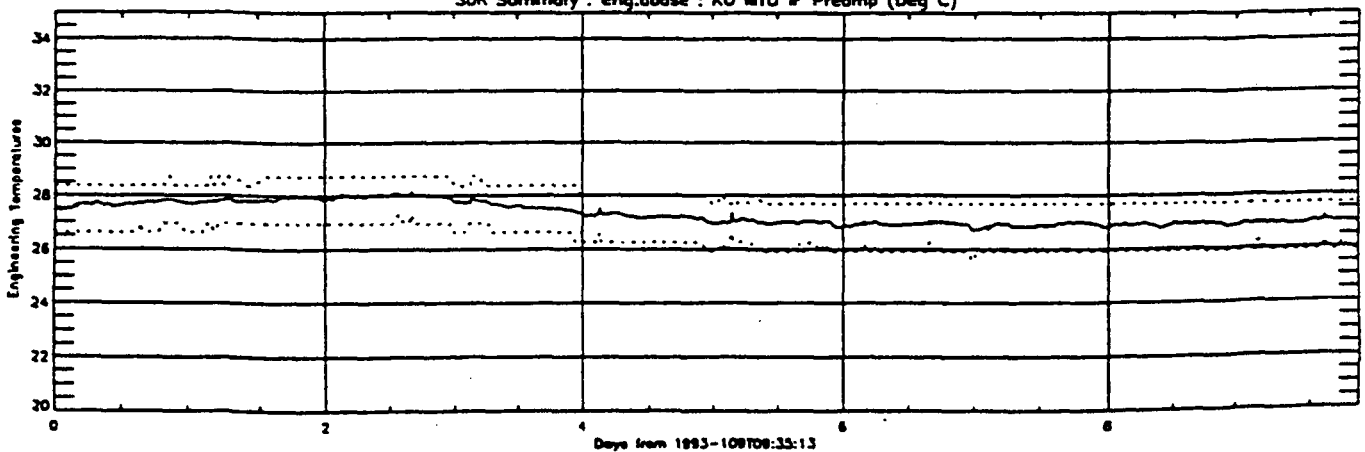
SDR Summary : eng.dbase : AGC Rec Section (Deg C)

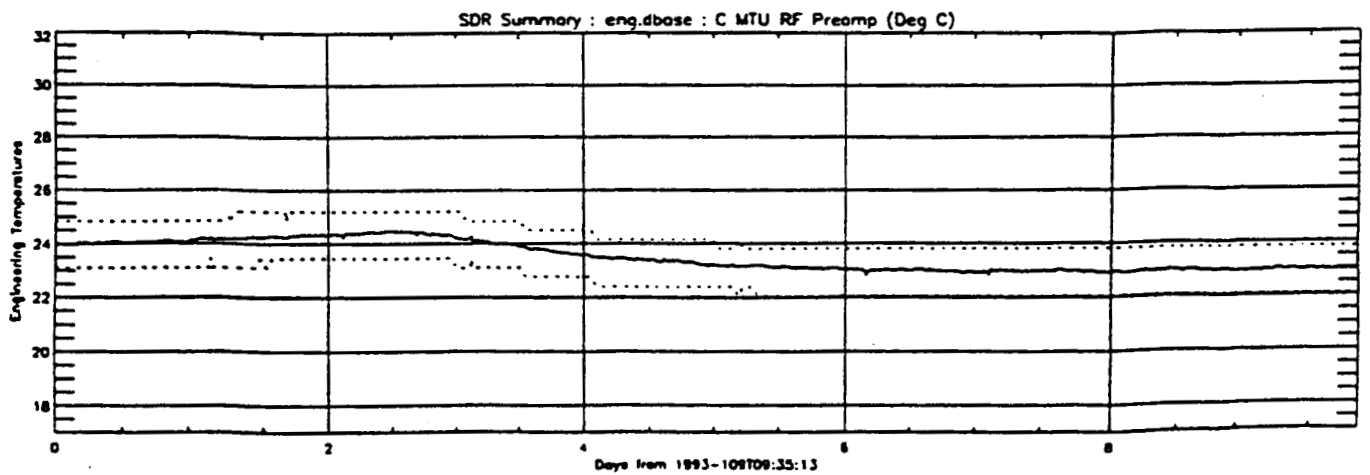
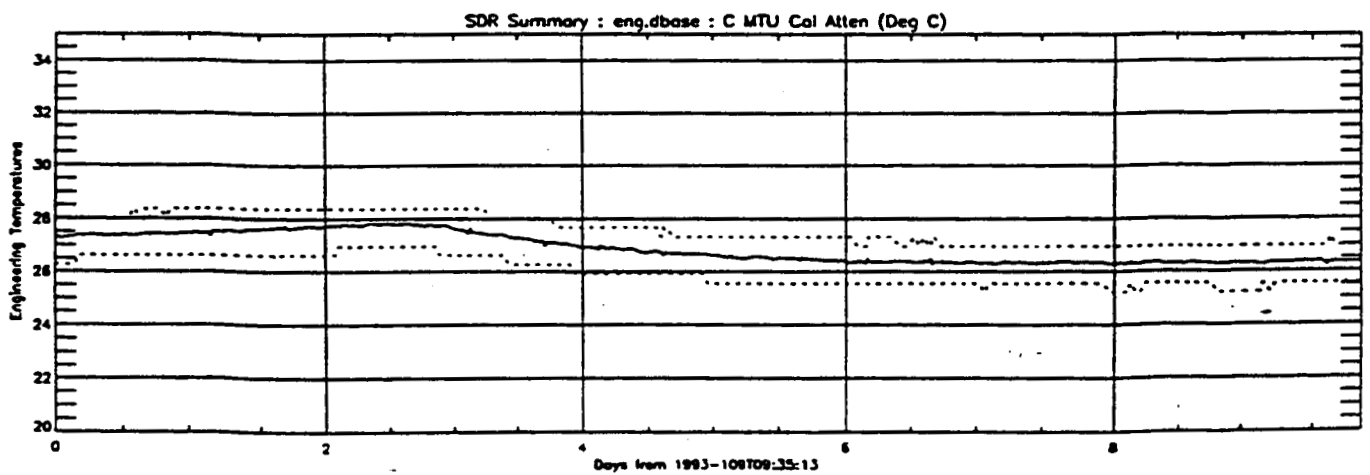
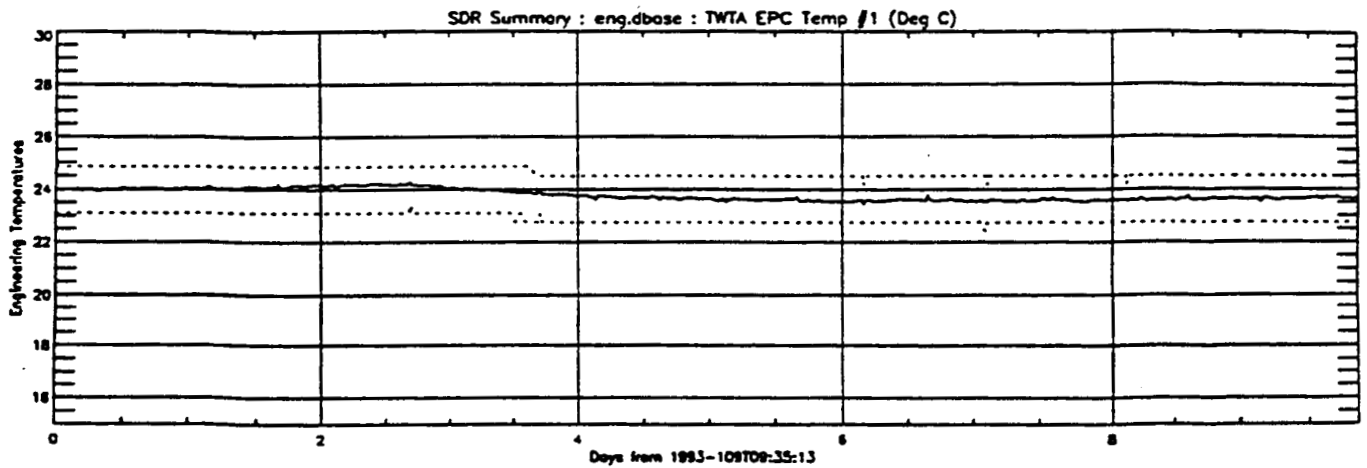
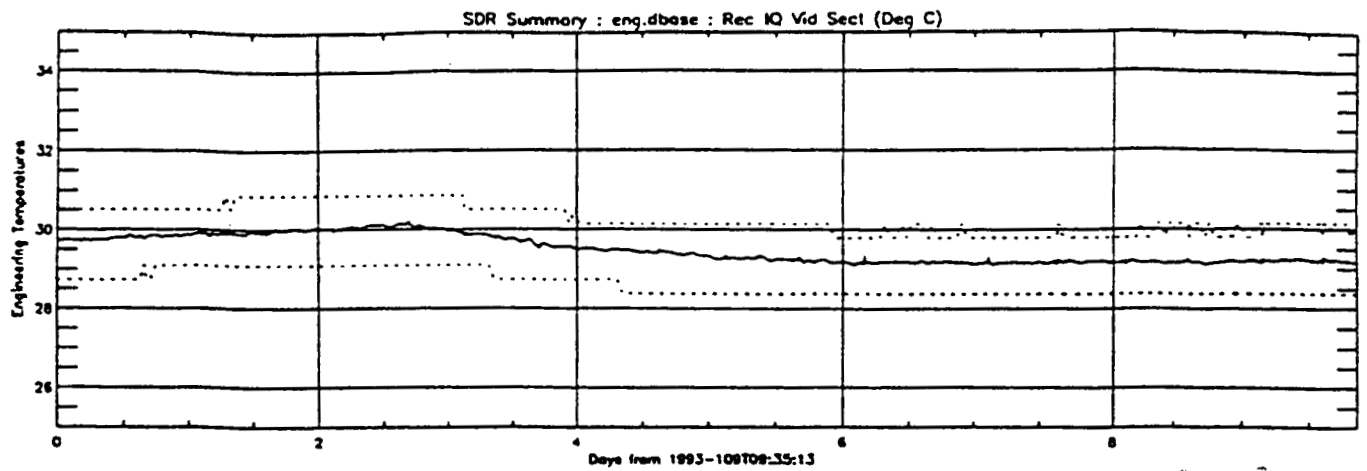


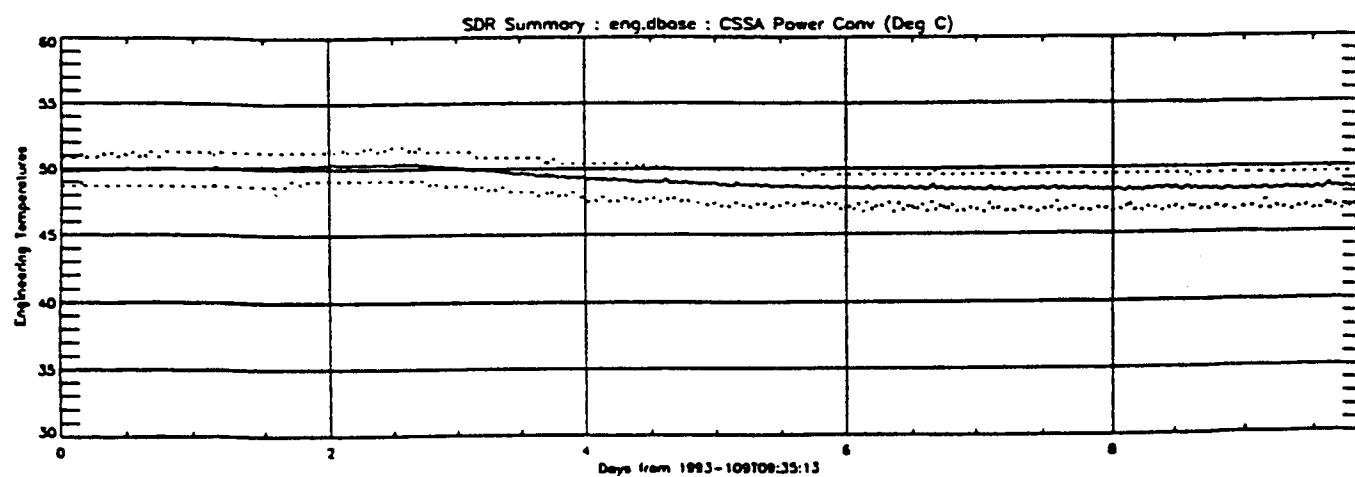
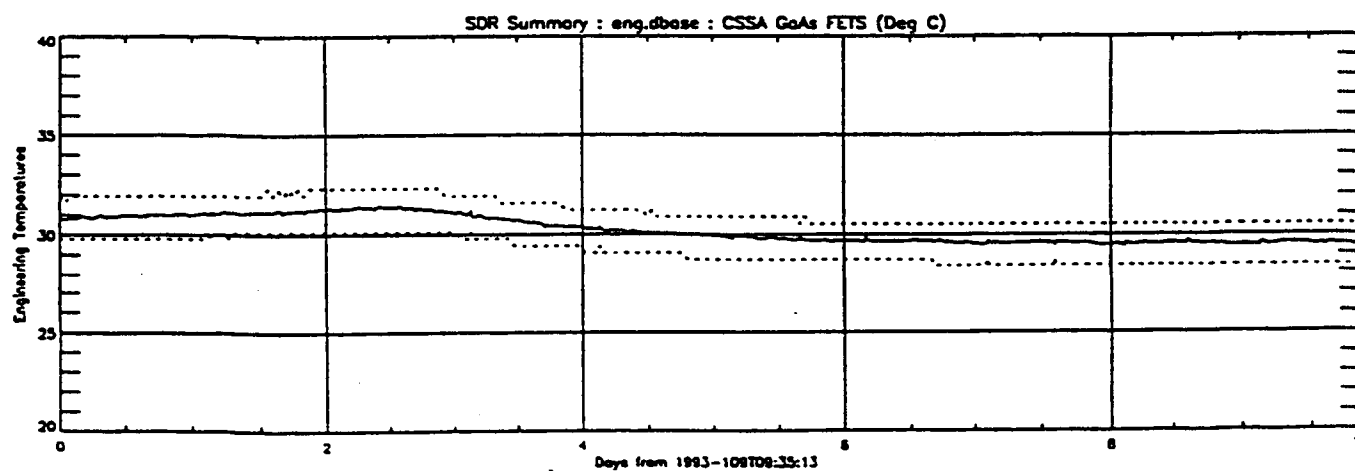
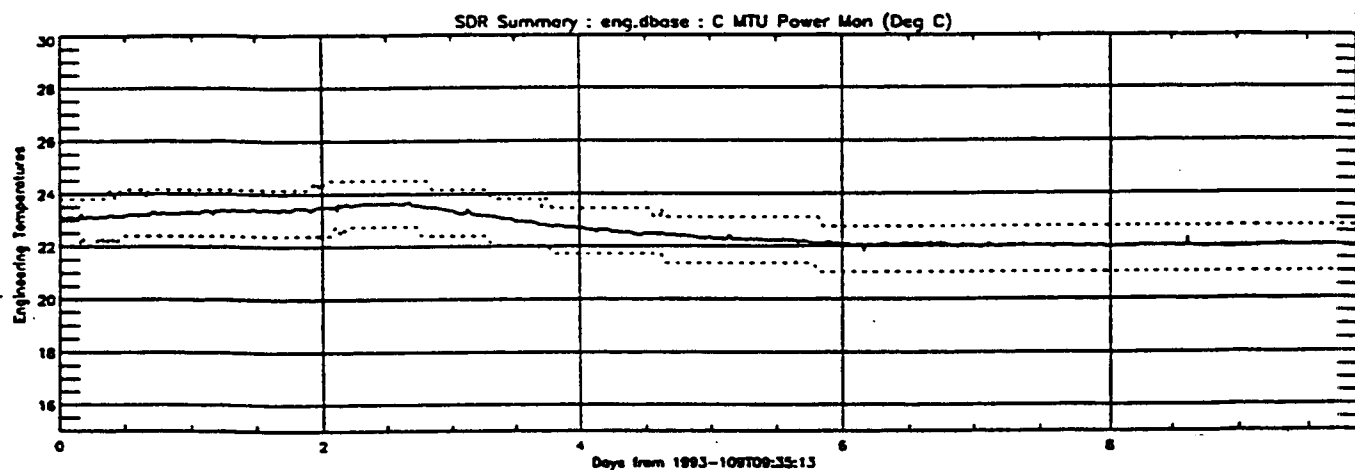
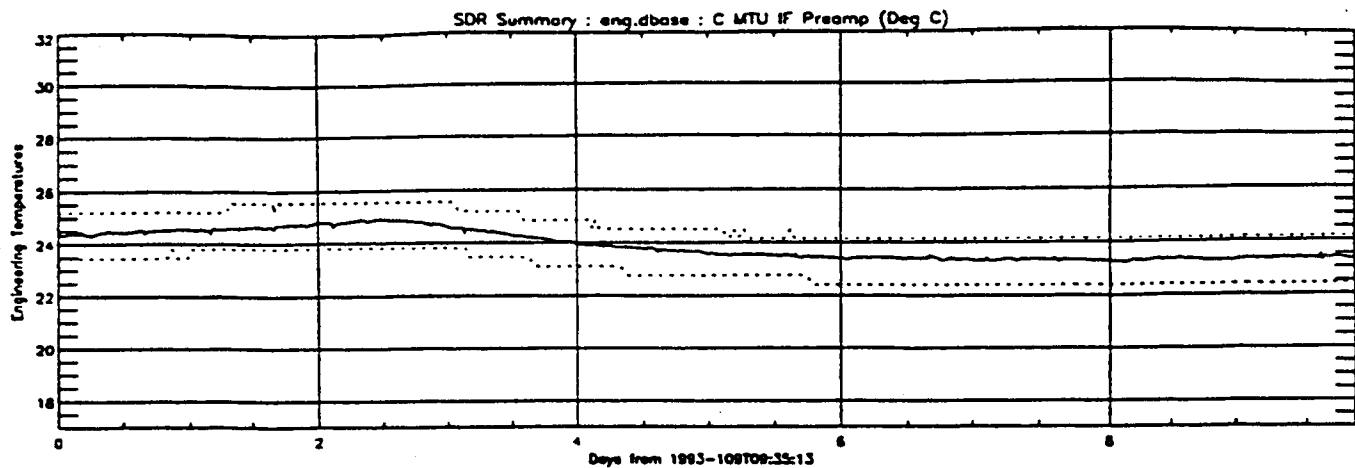
SDR Summary : eng.dbase : SSU (Deg C)

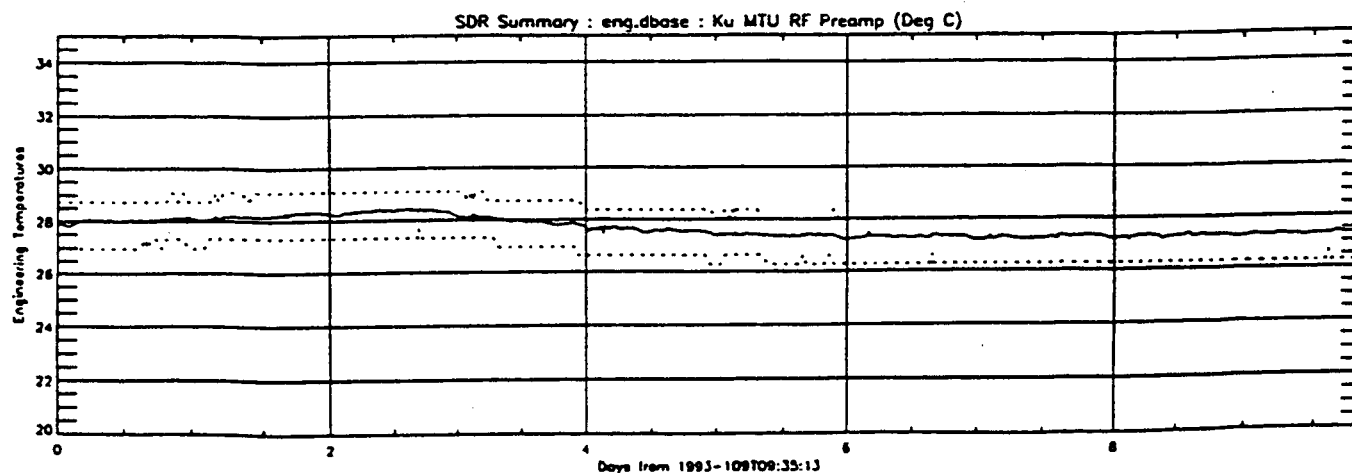
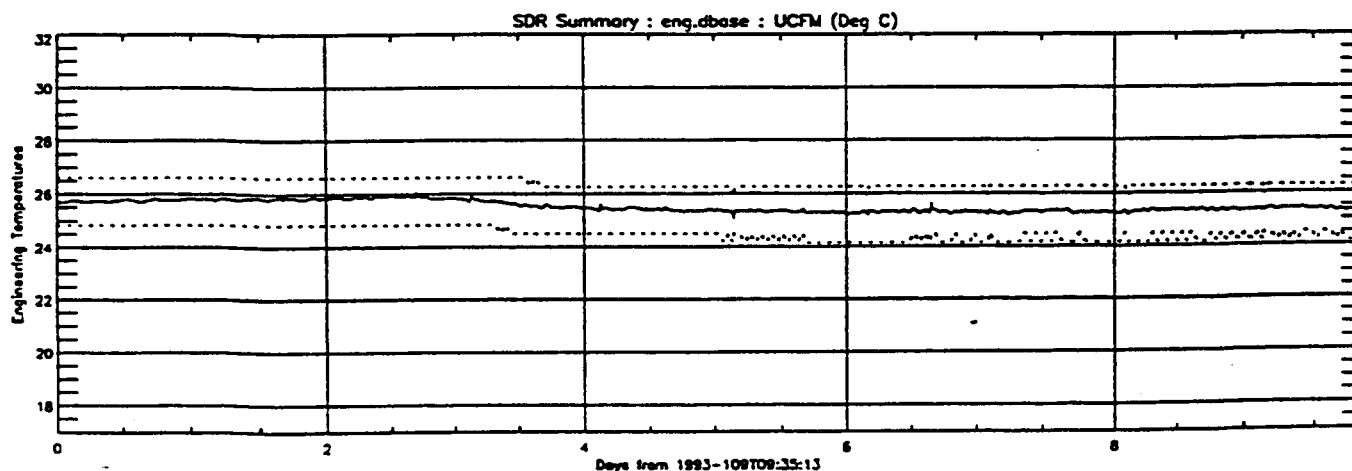
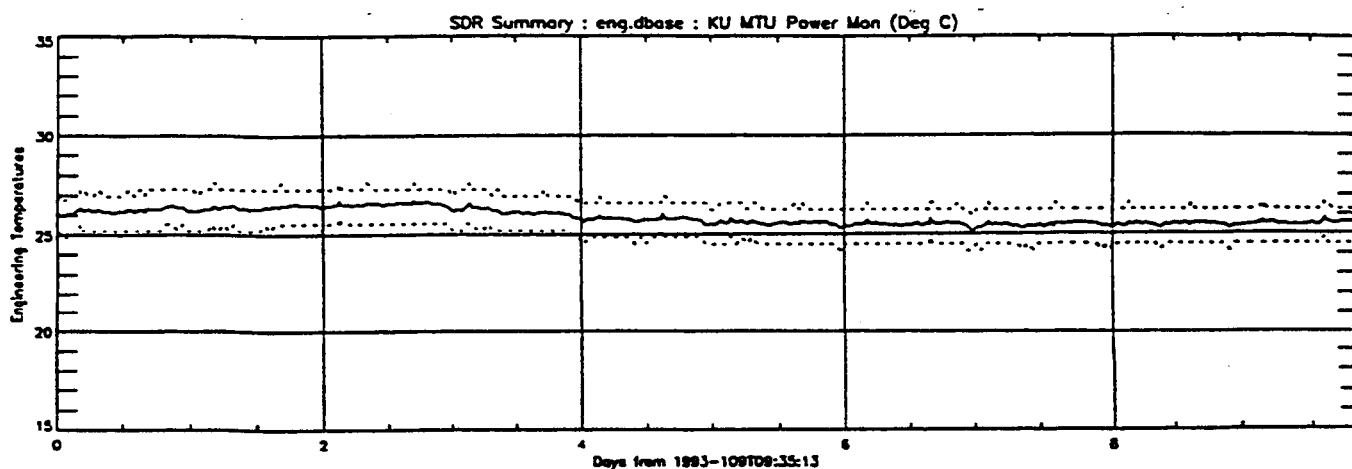
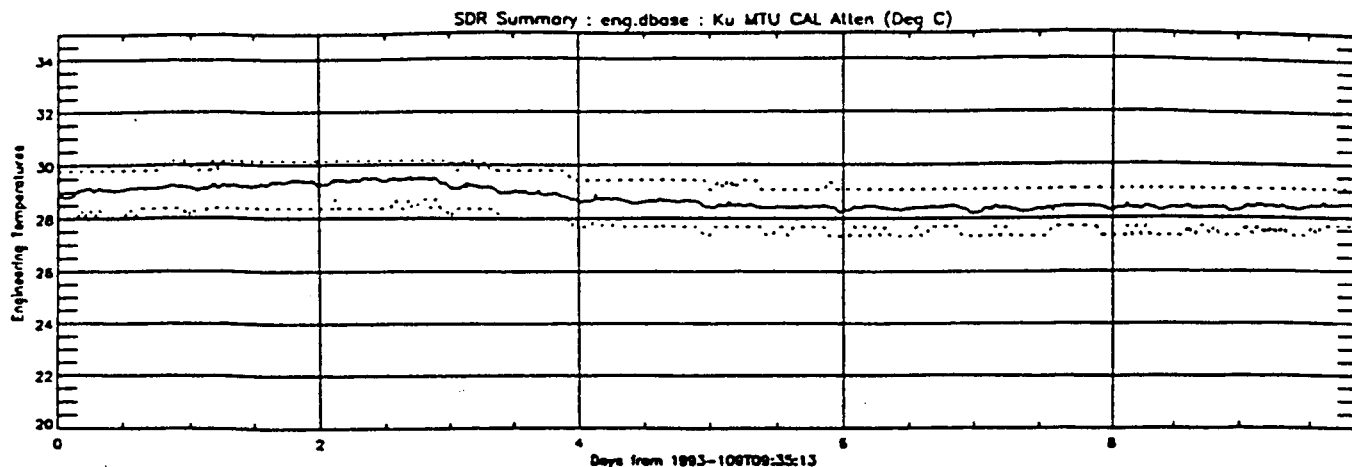


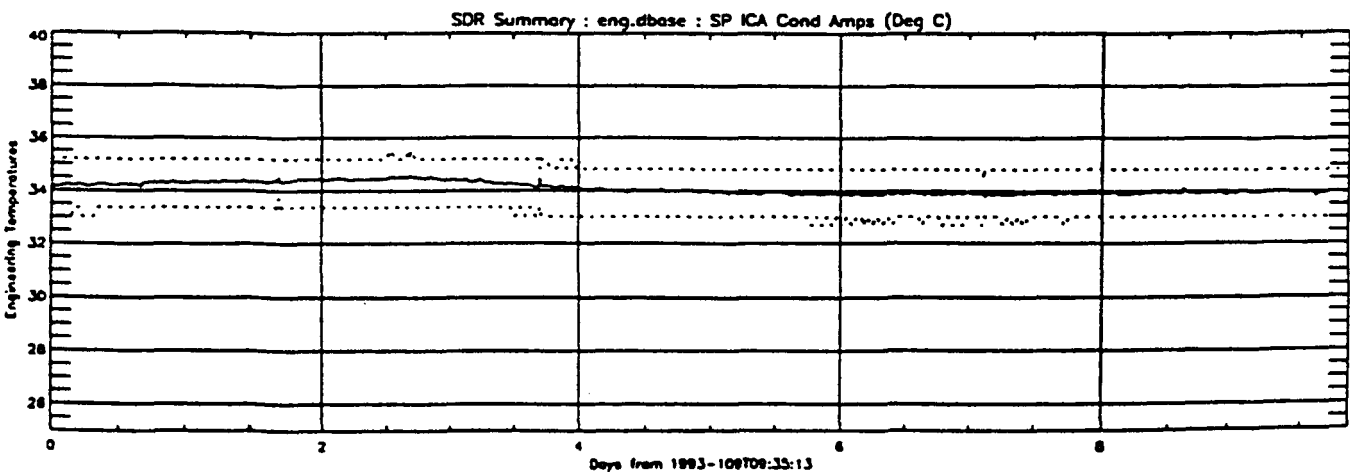
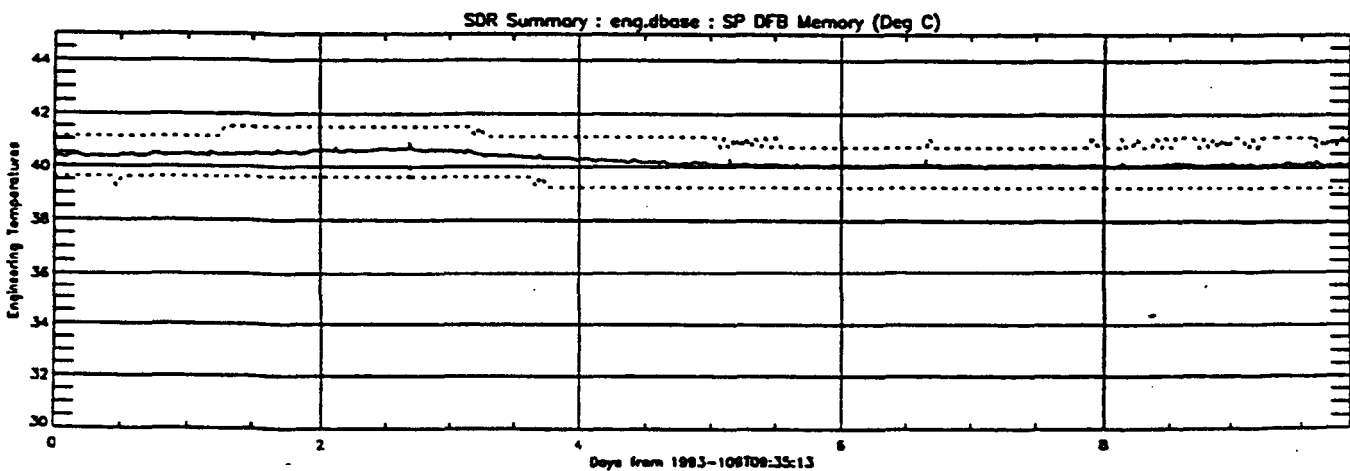
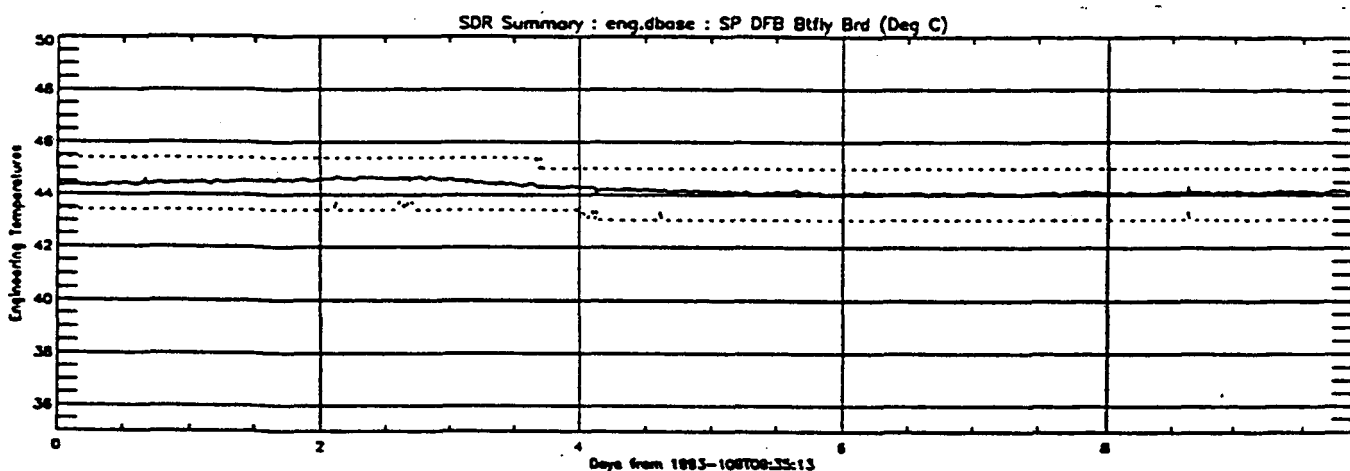
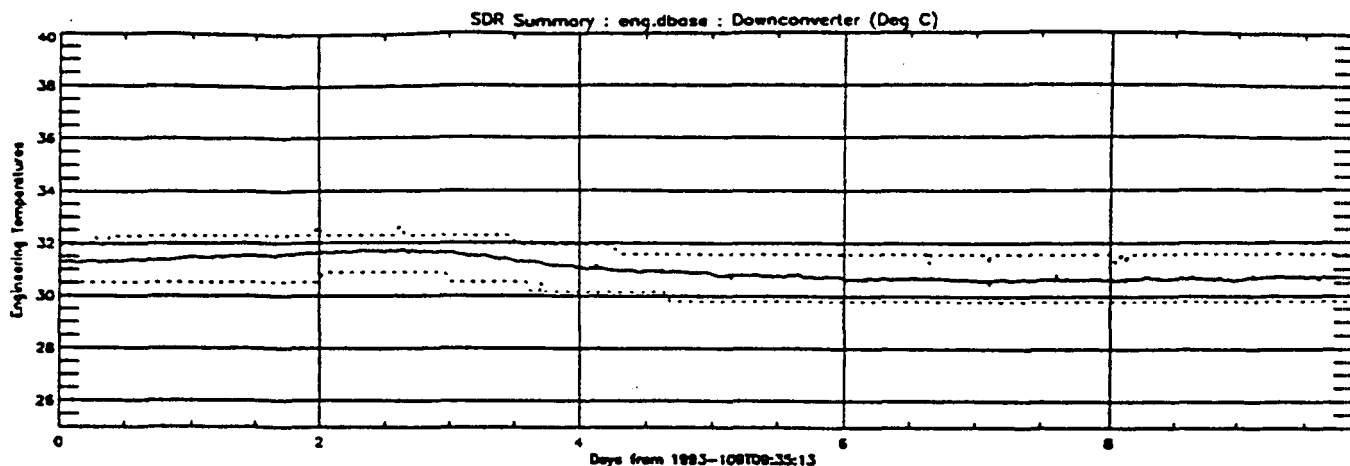
SDR Summary : eng.dbase : KU MTU IF Preamp (Deg C)

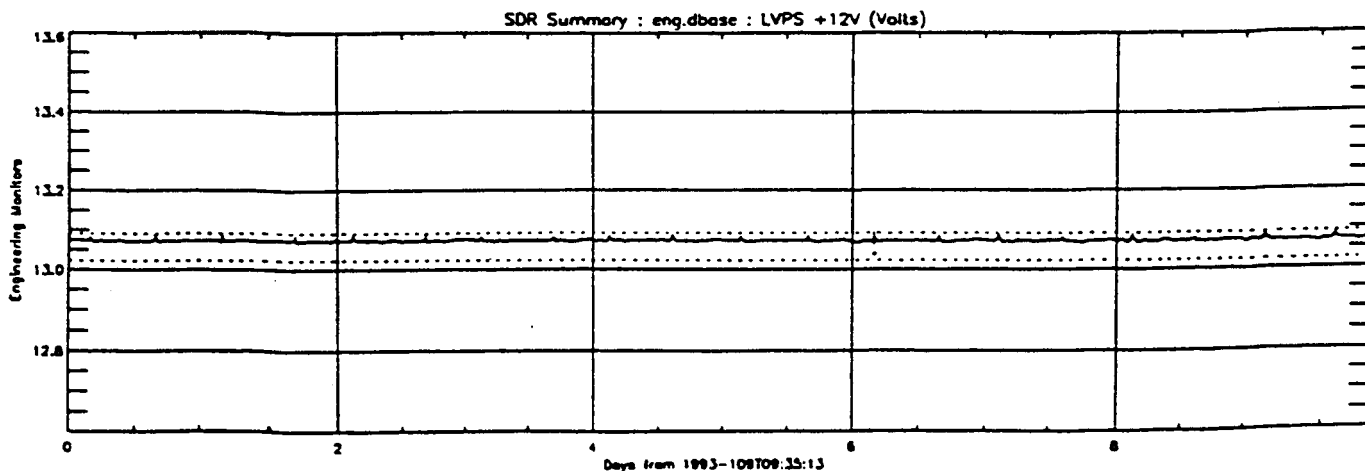
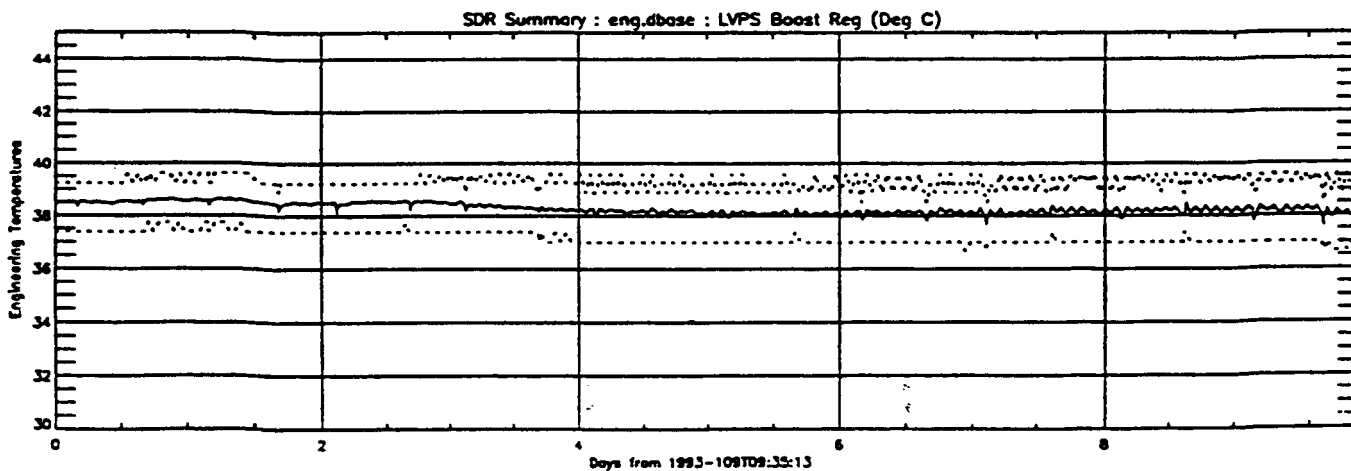
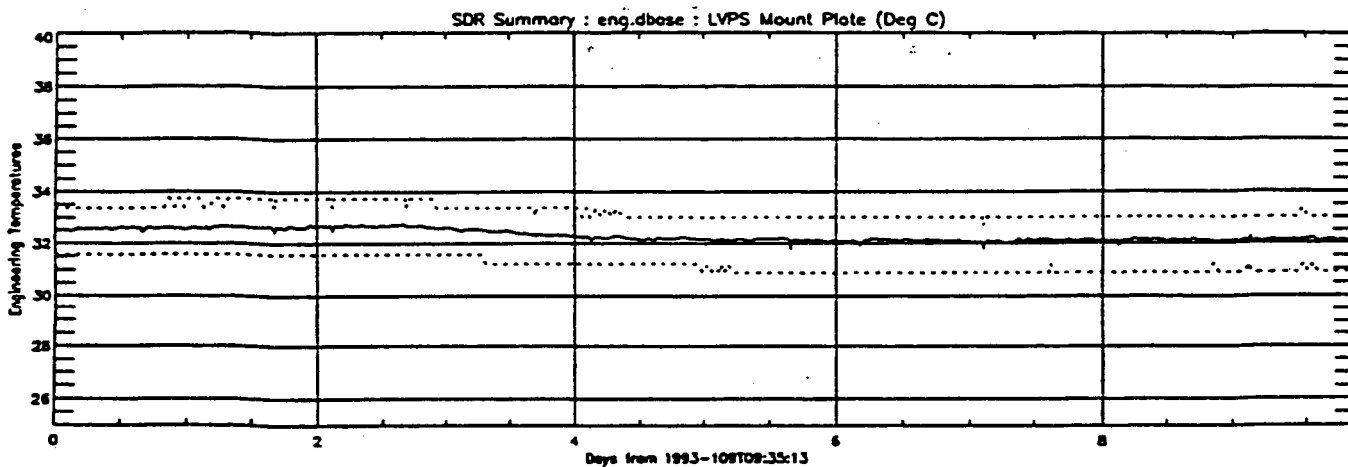
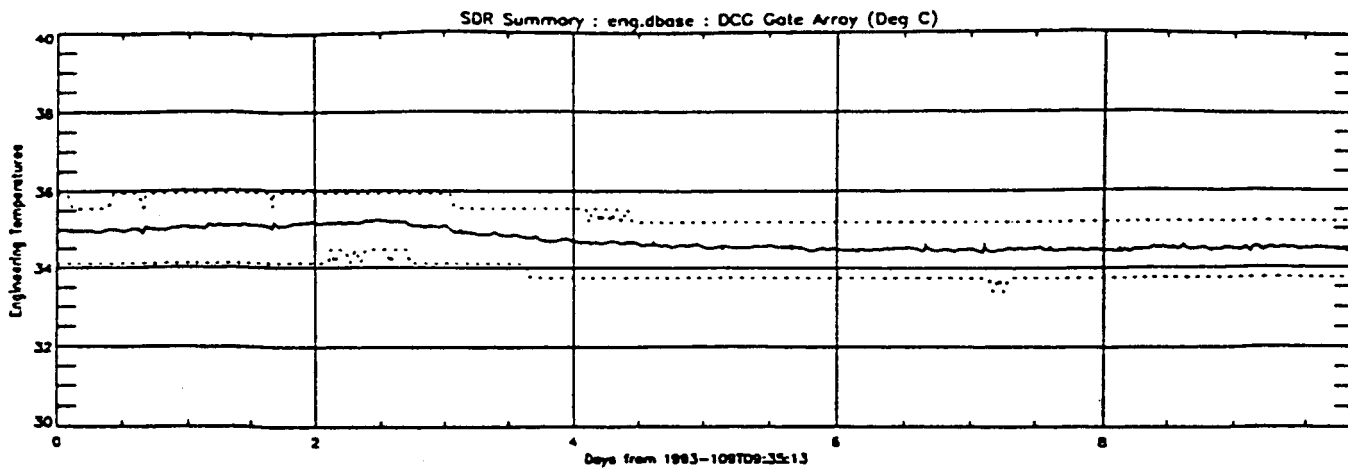


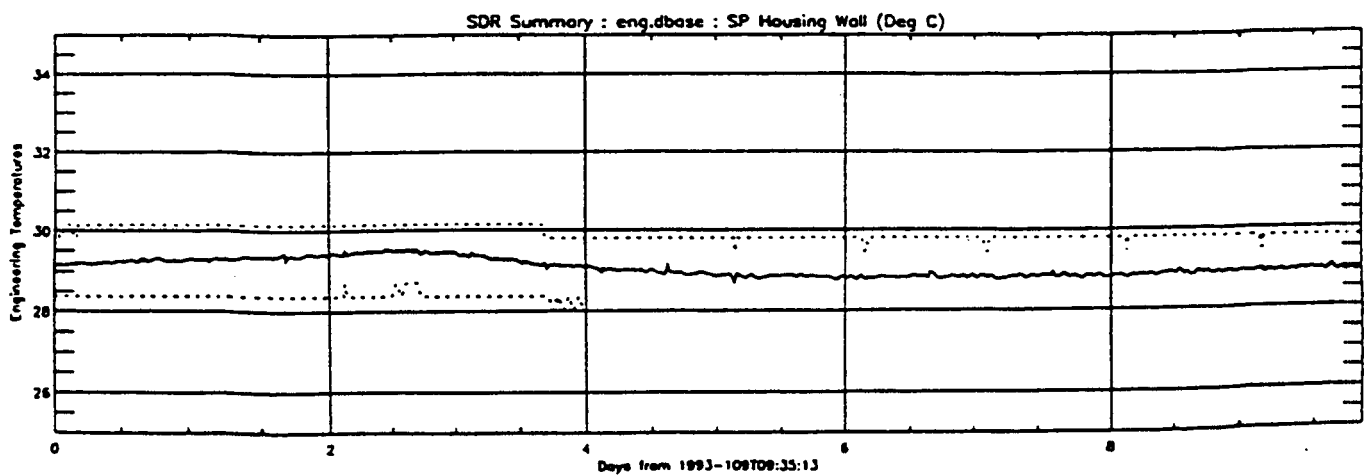
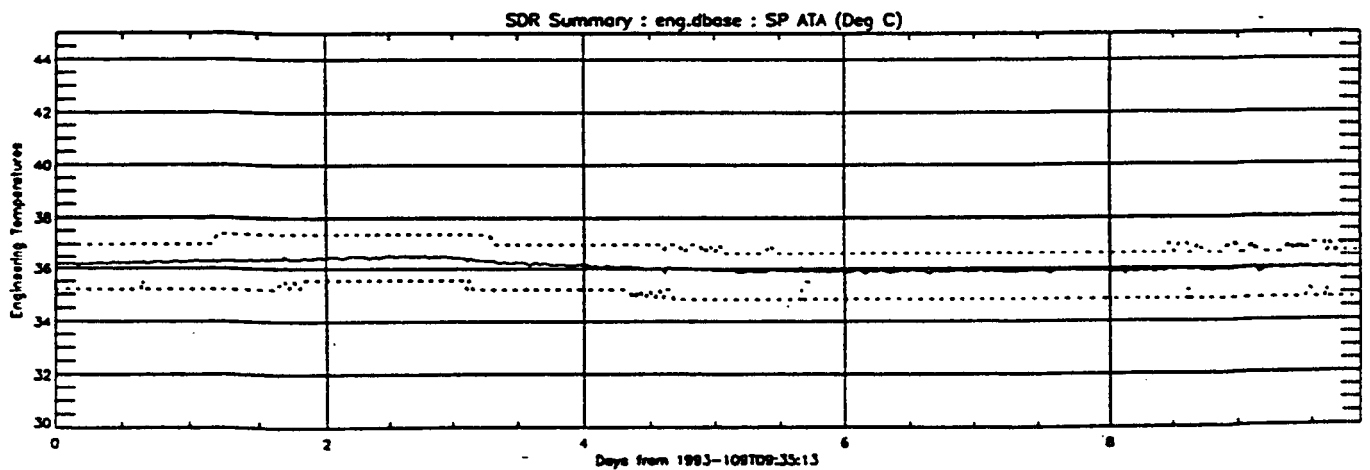
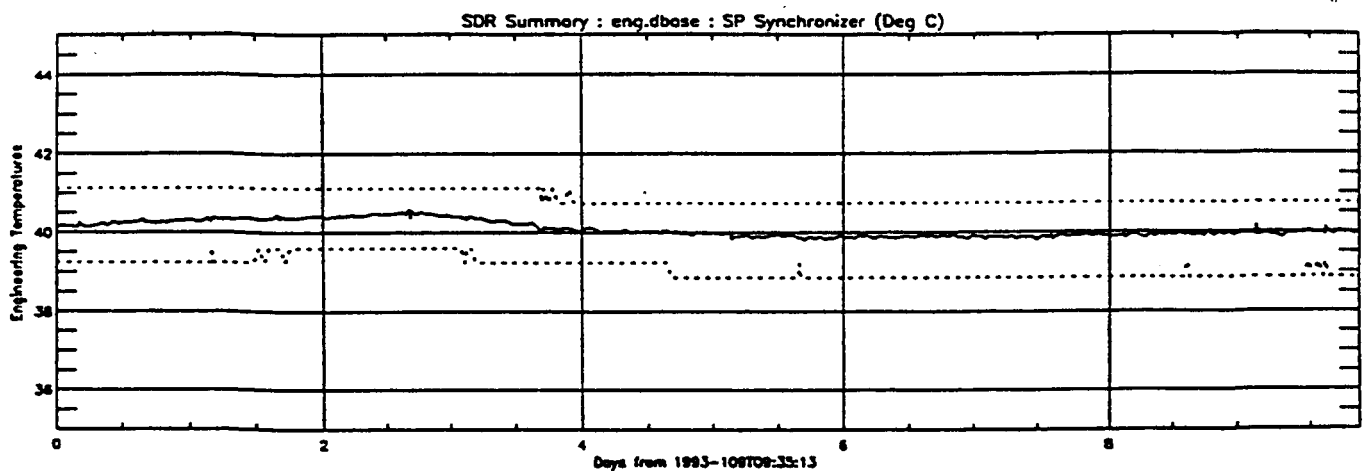
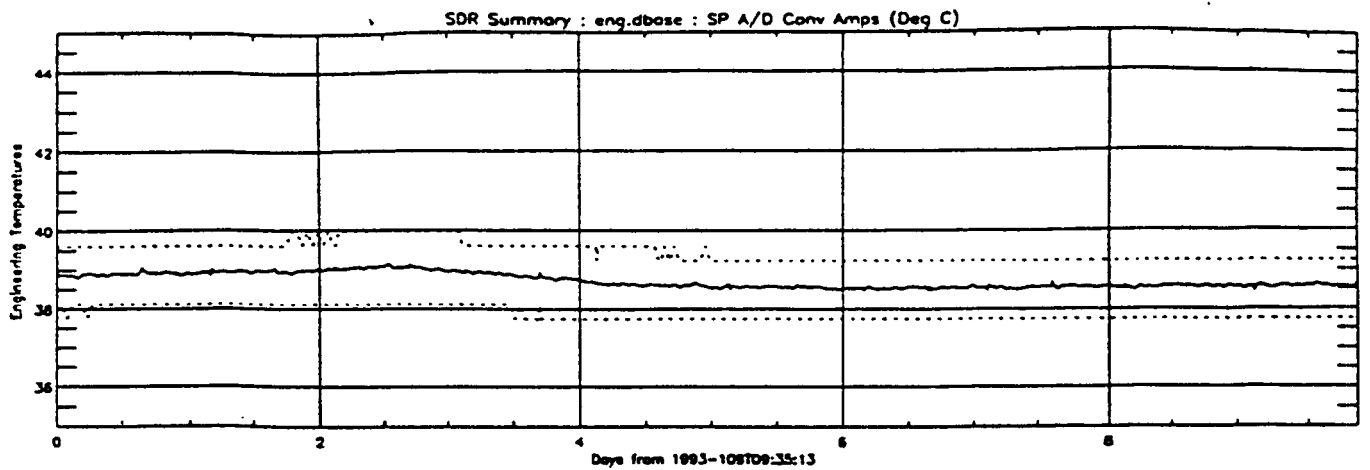


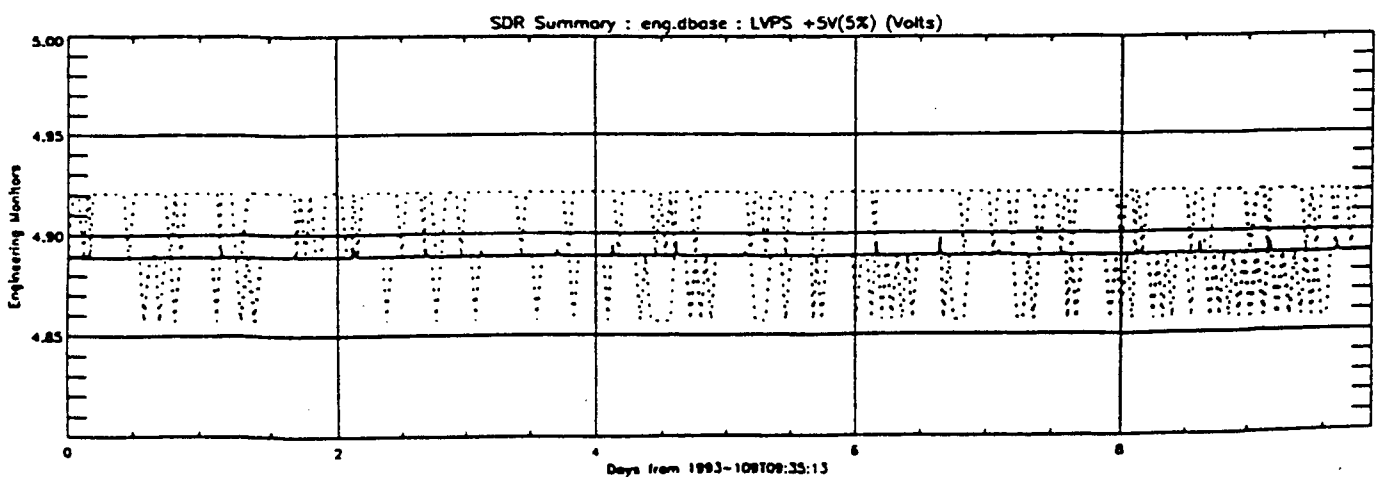
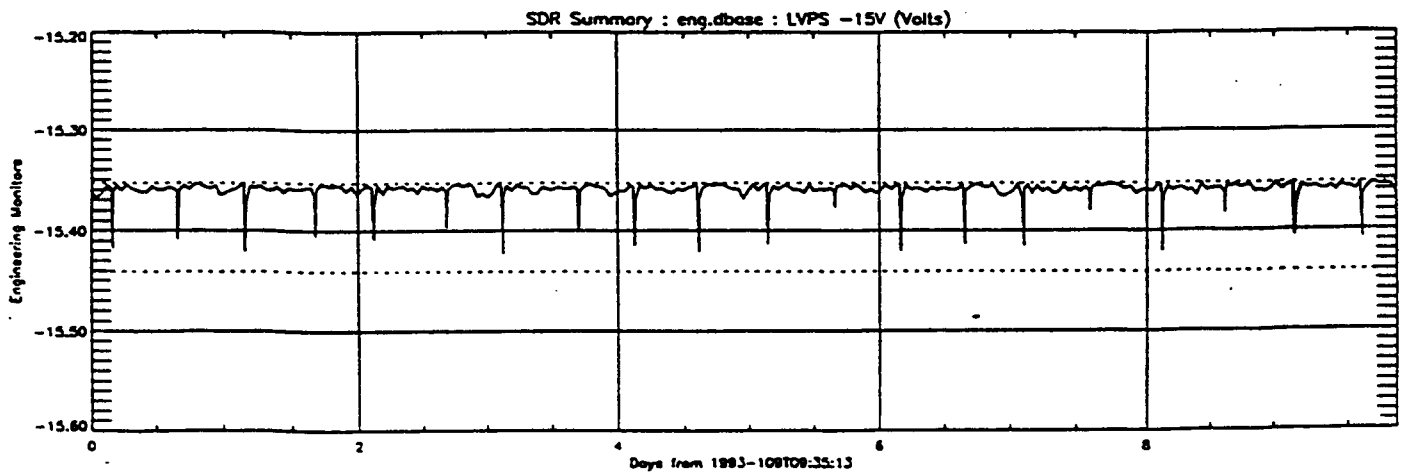
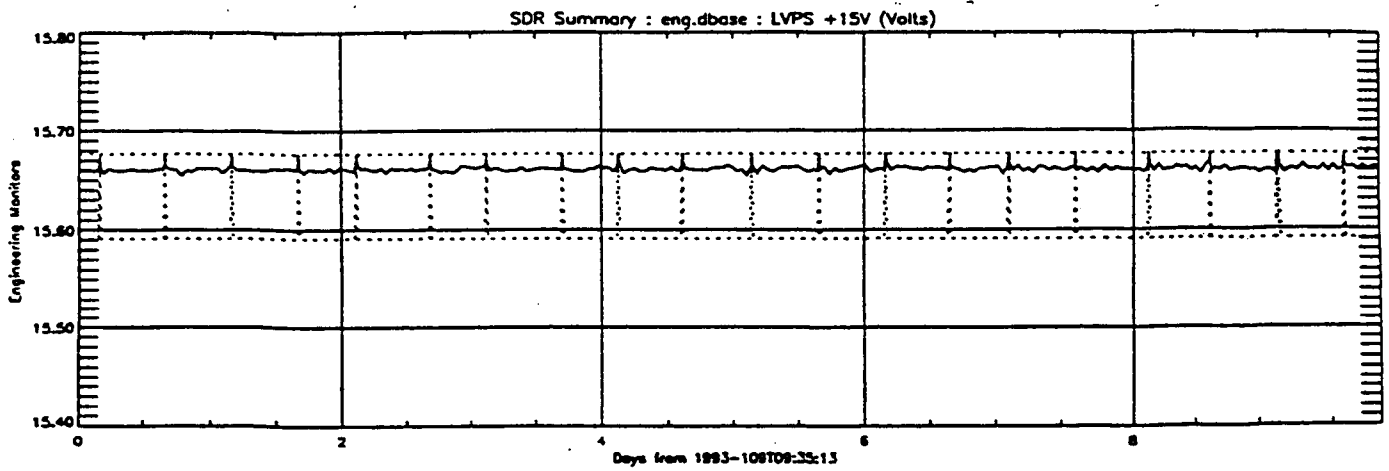
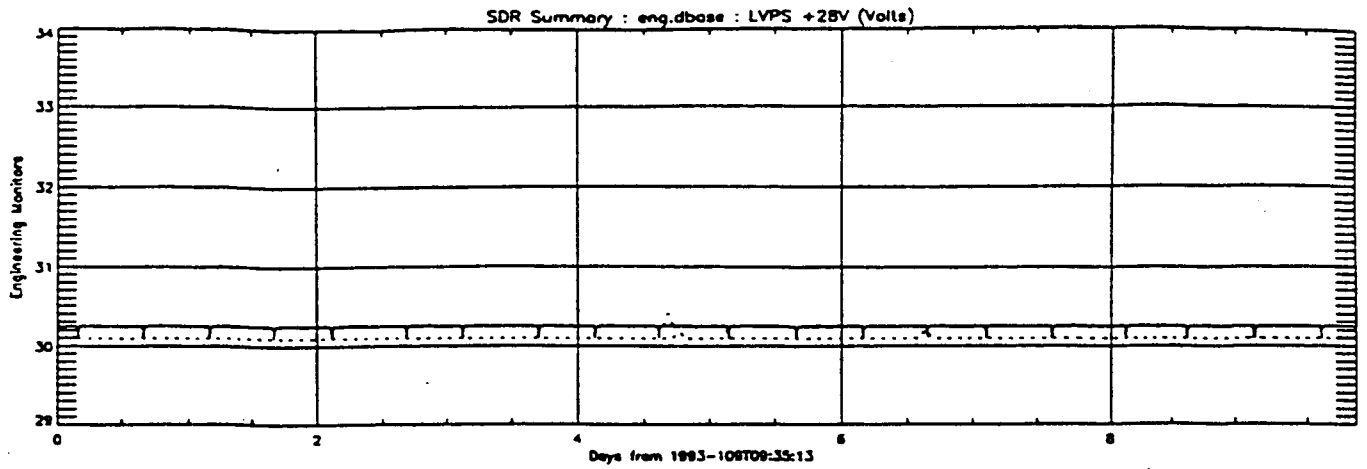




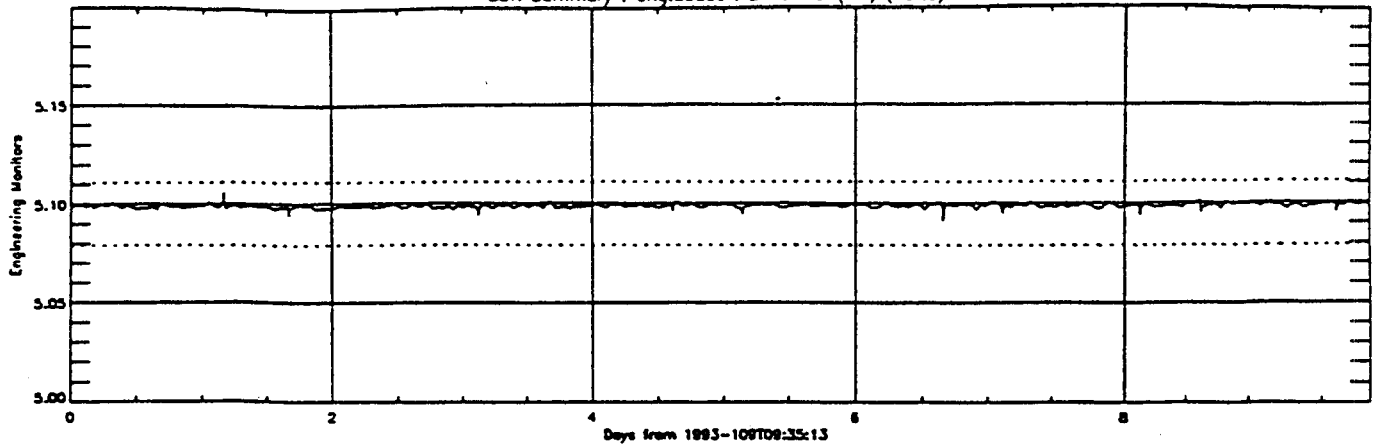




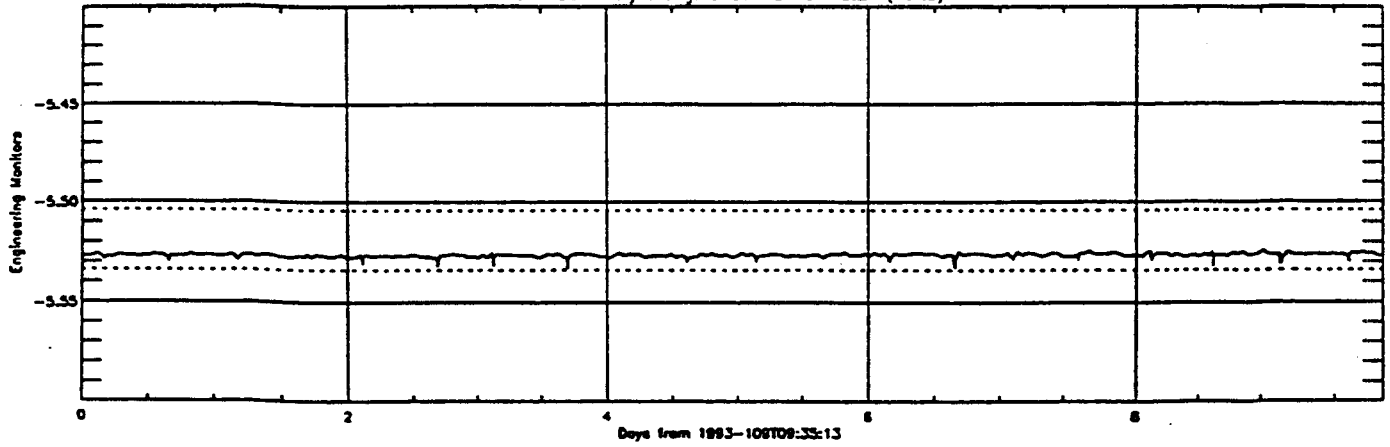




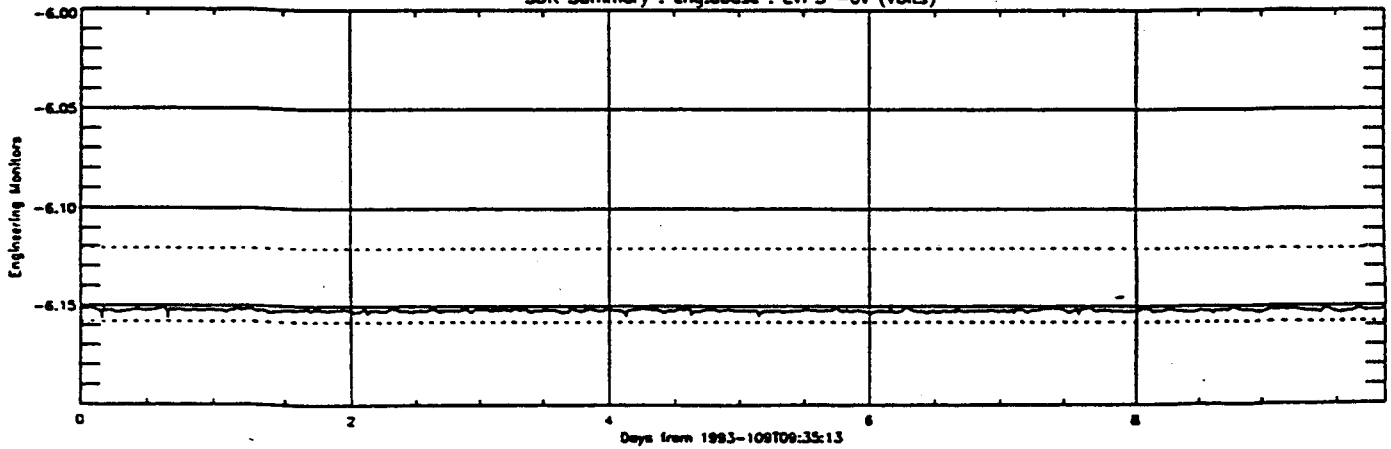
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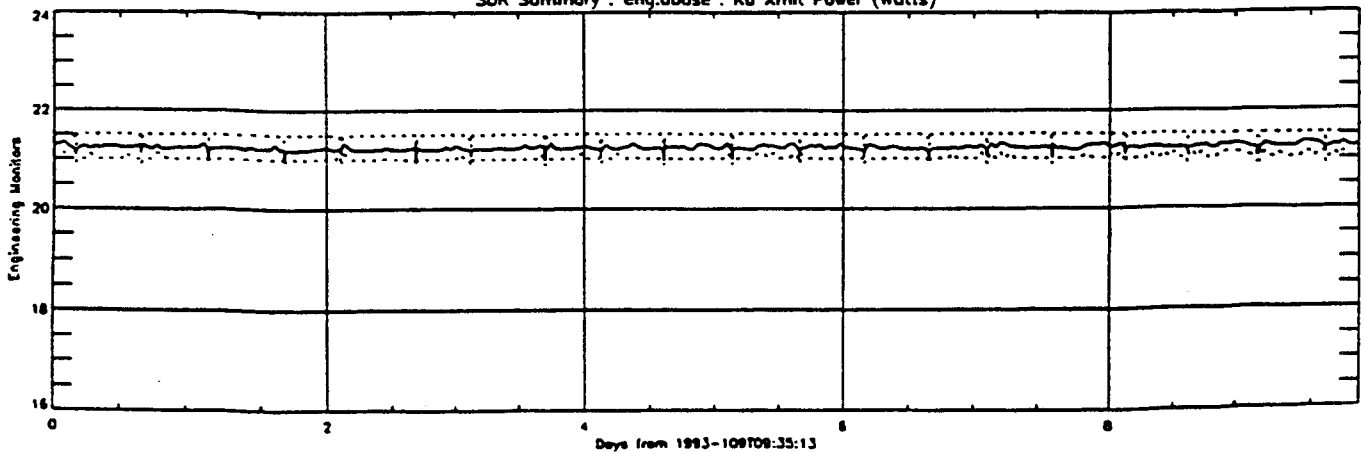
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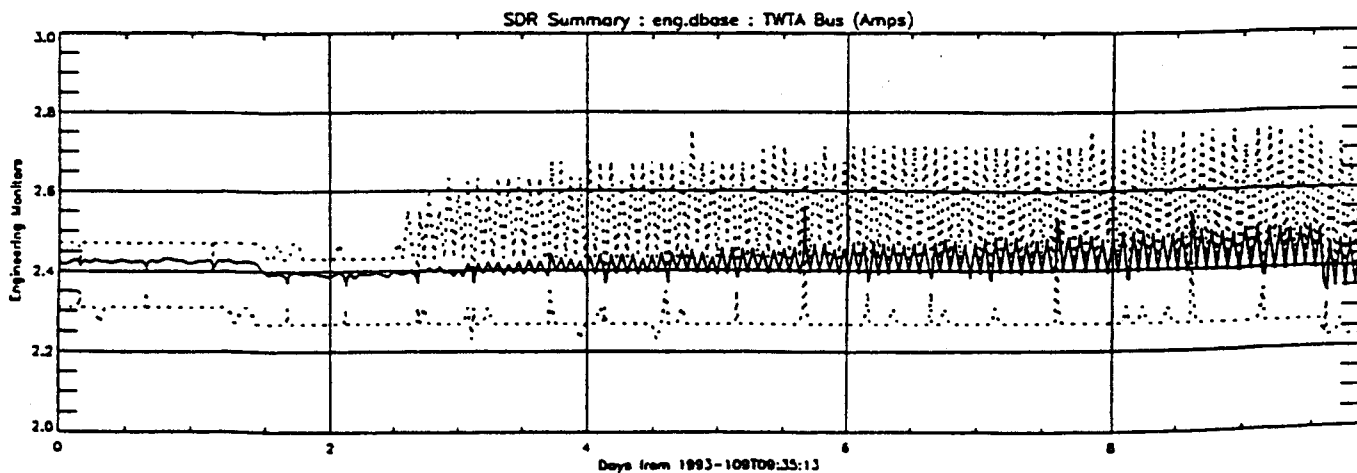
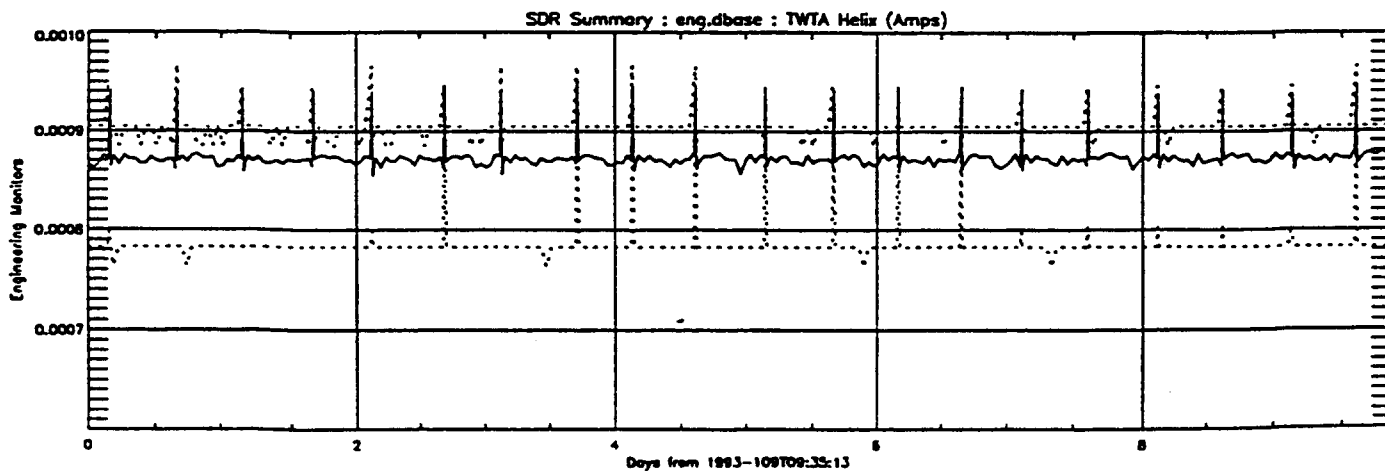
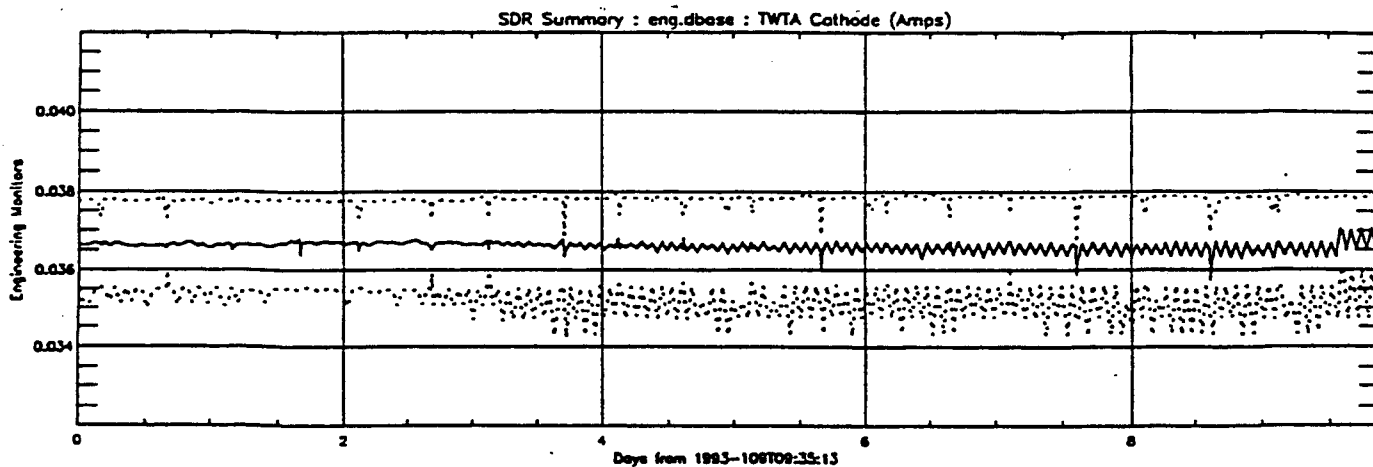
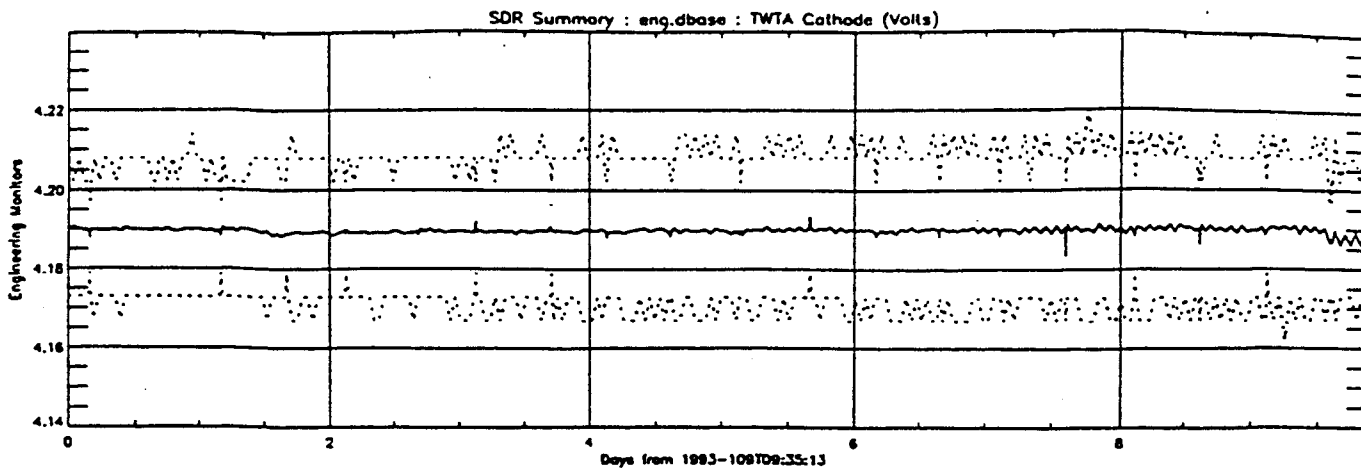


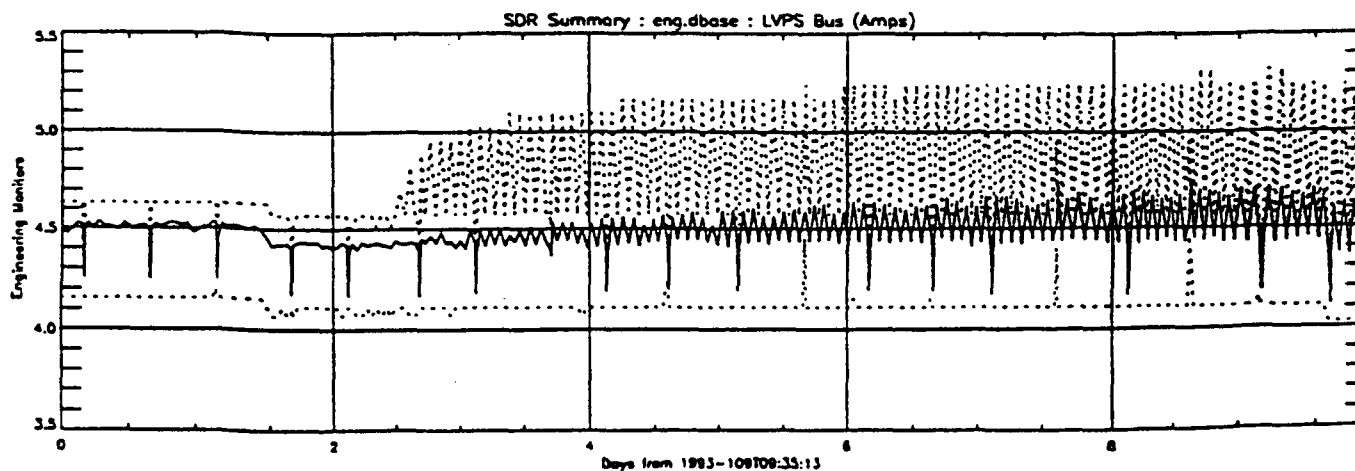
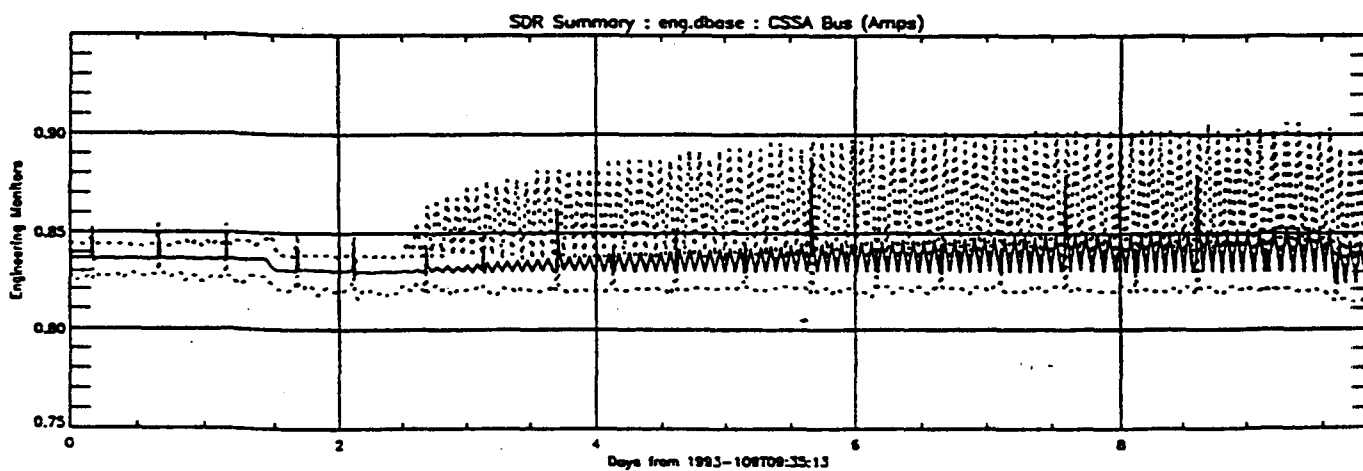
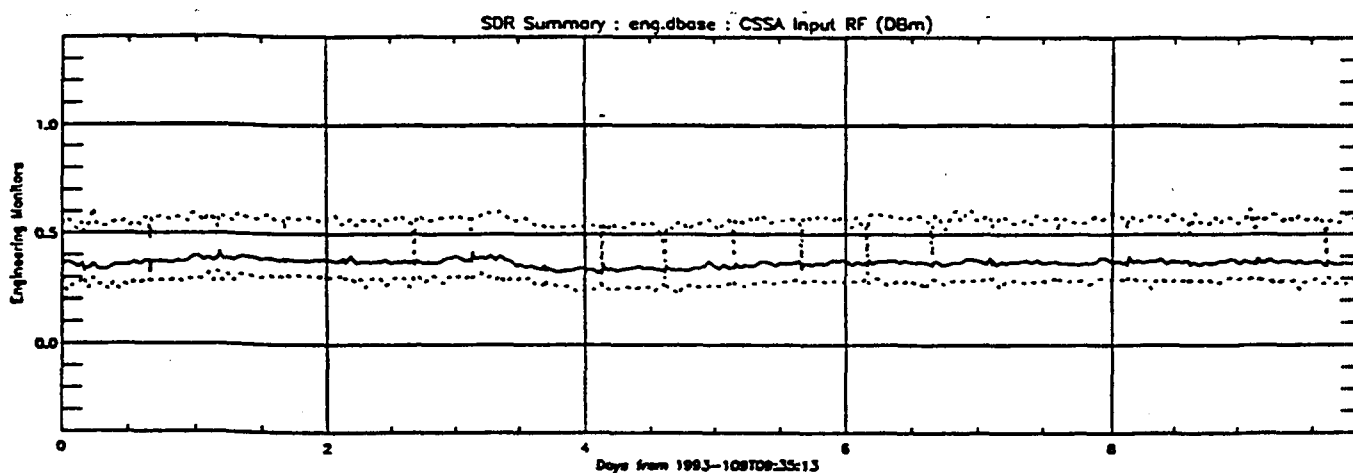
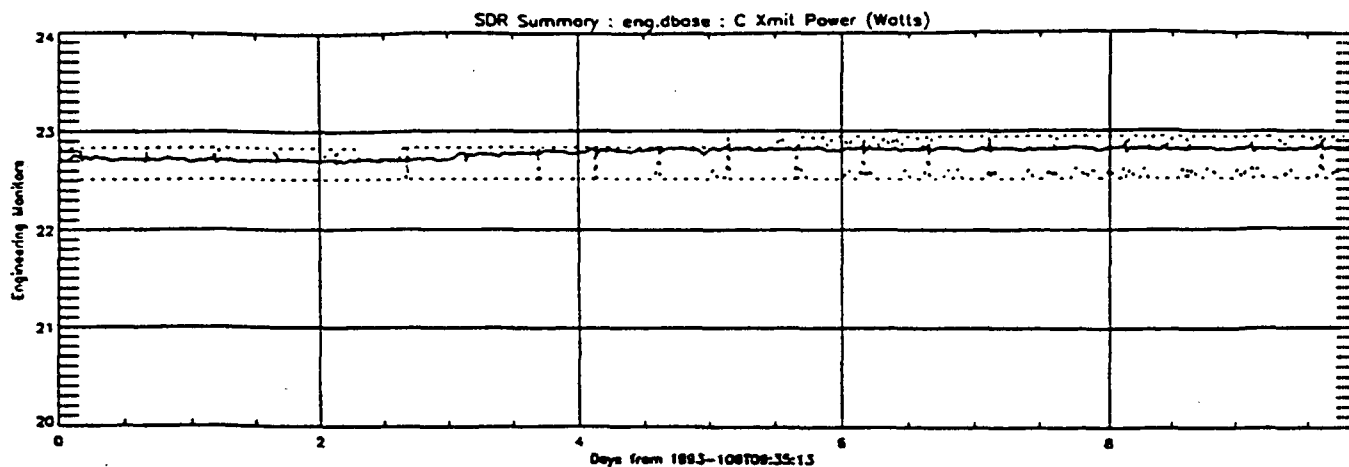
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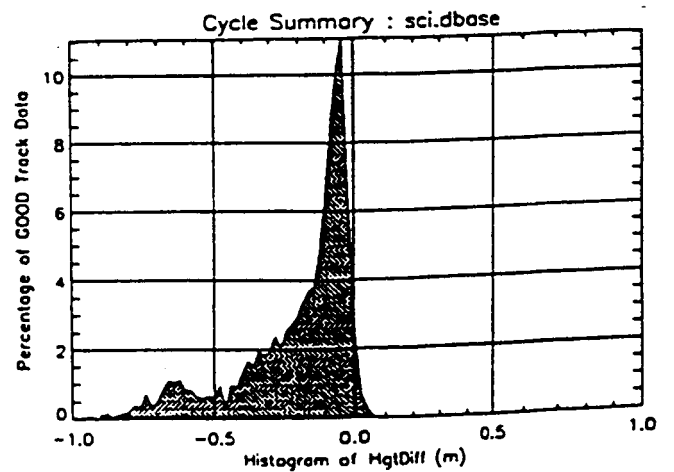
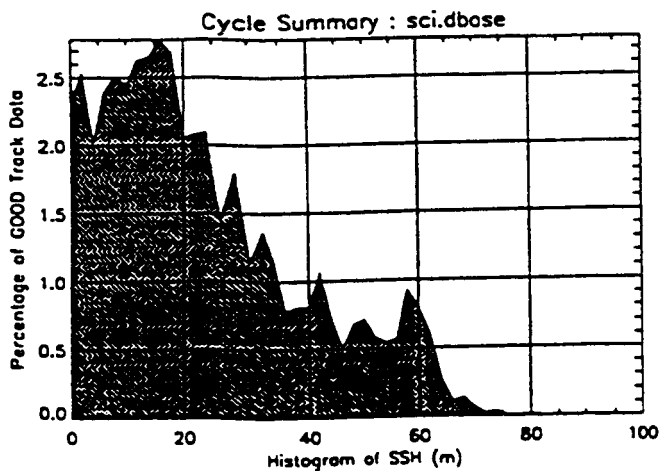
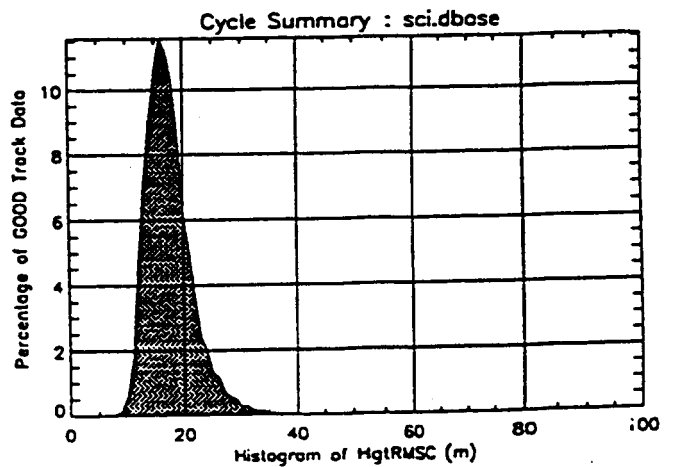
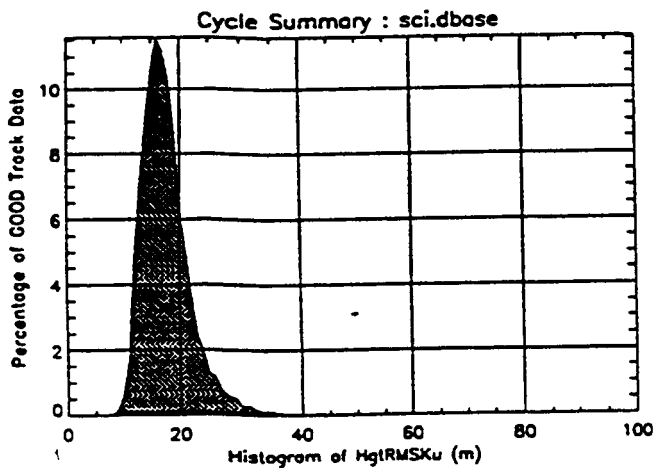
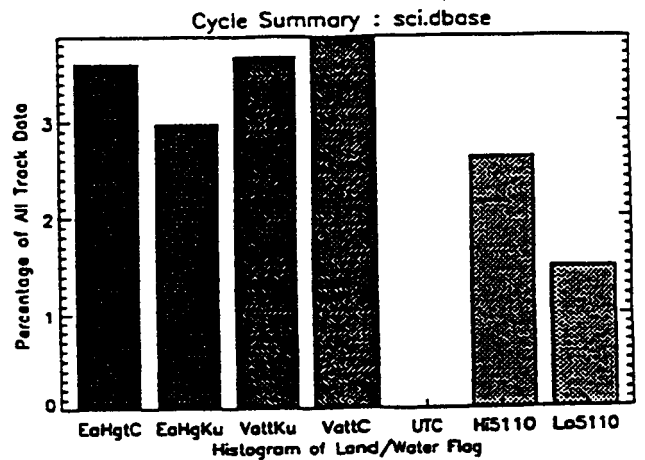
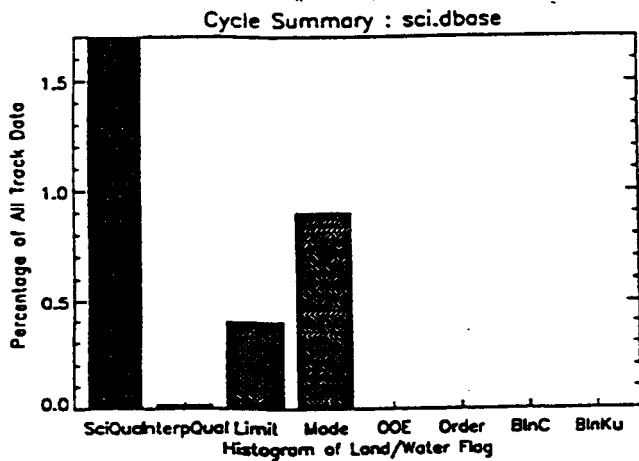
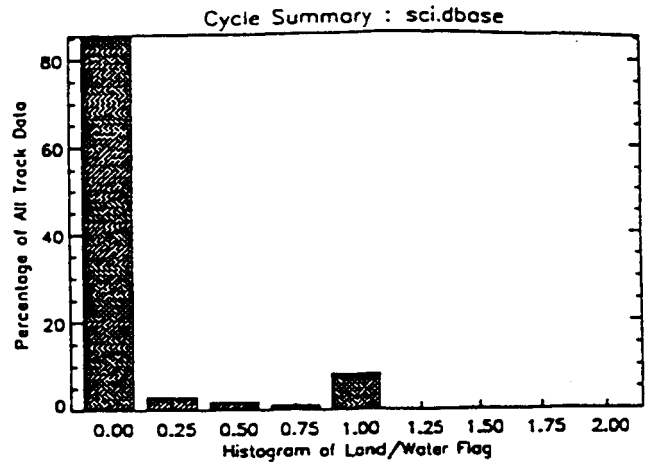
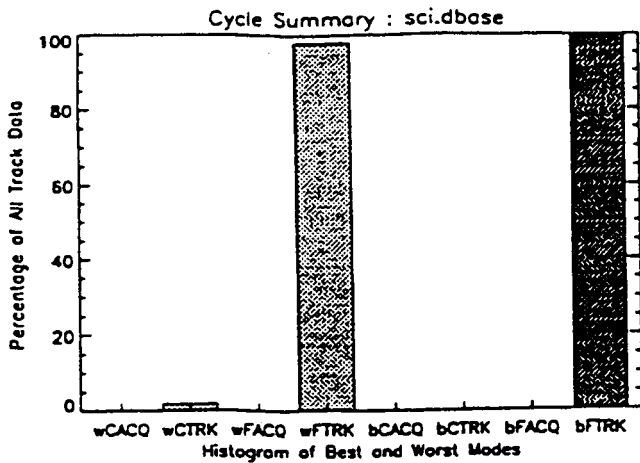


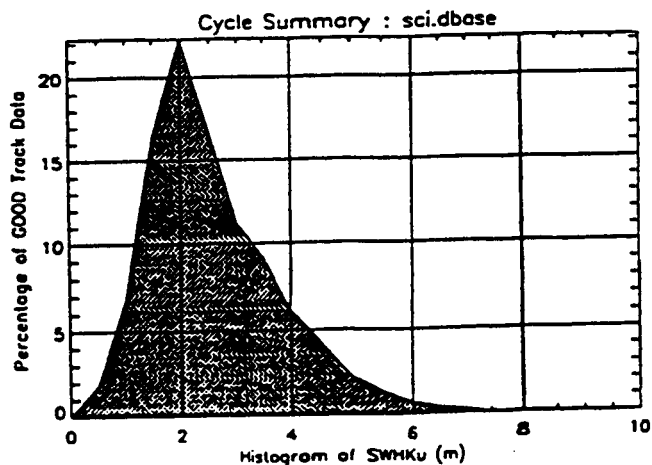
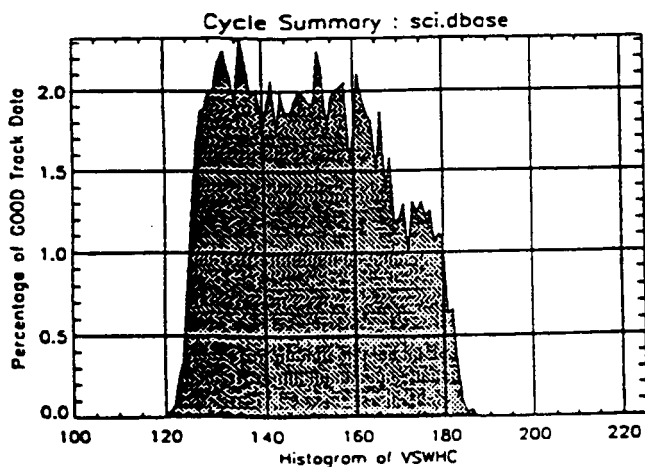
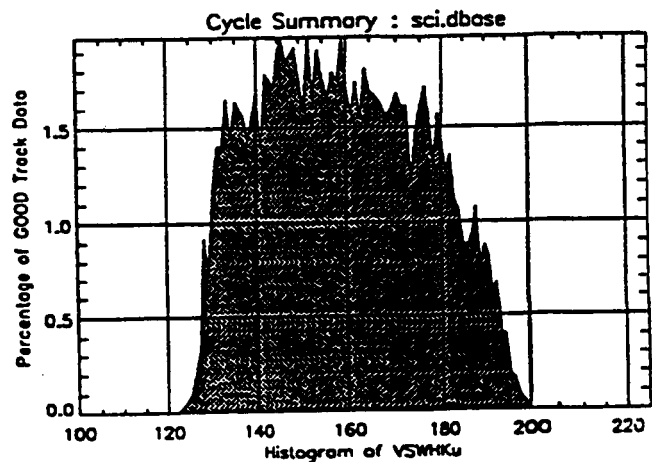
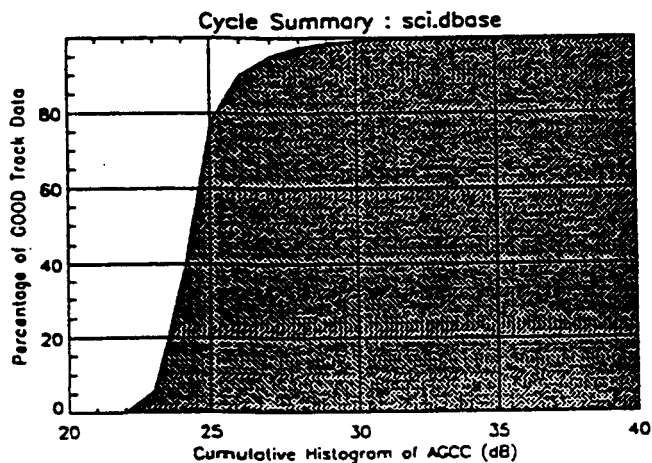
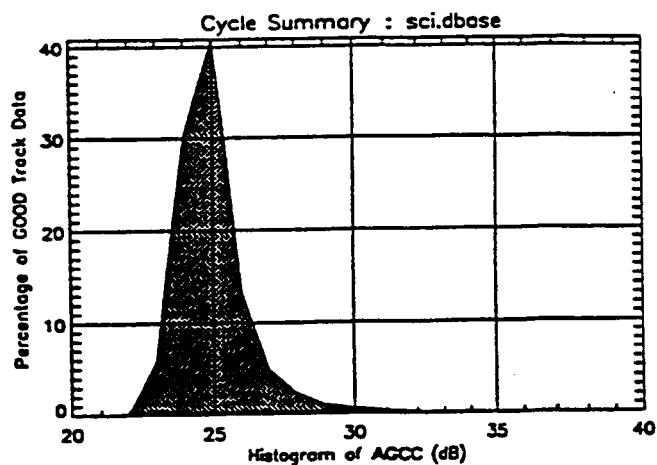
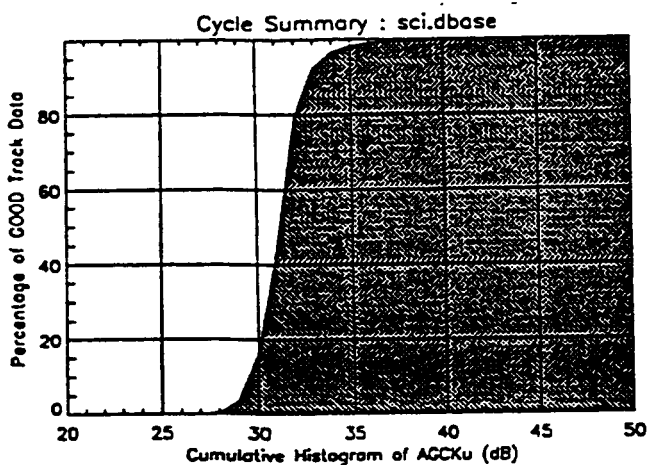
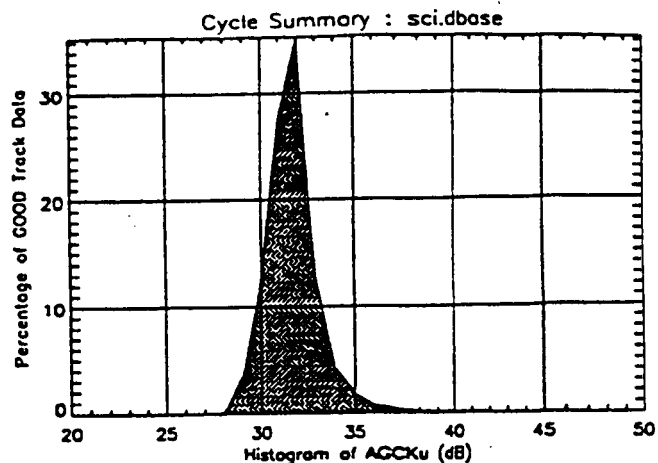
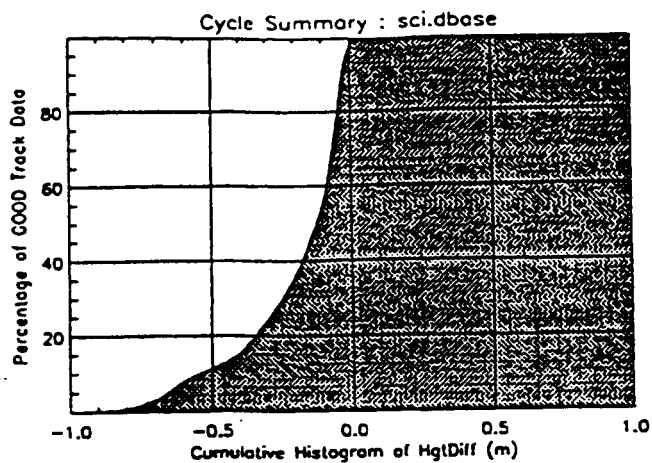
SDR Summary : eng.dbase : Ku Xmit Power (Watts)

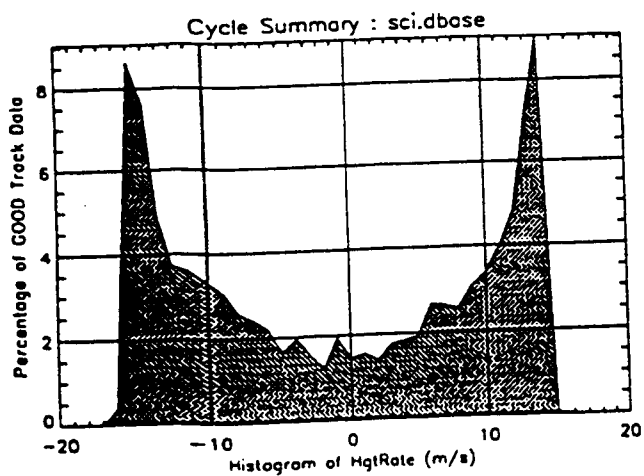
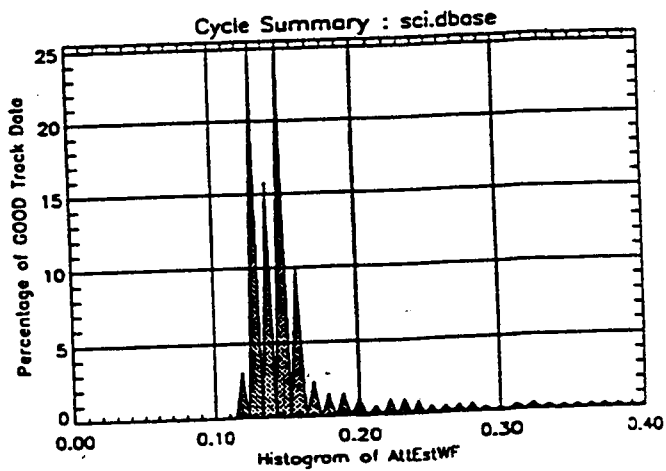
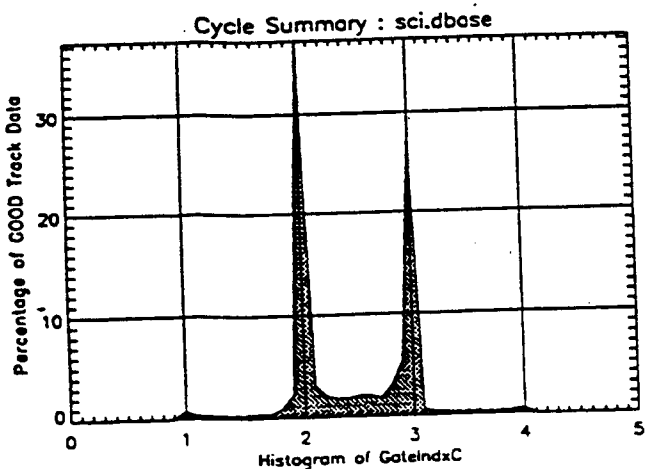
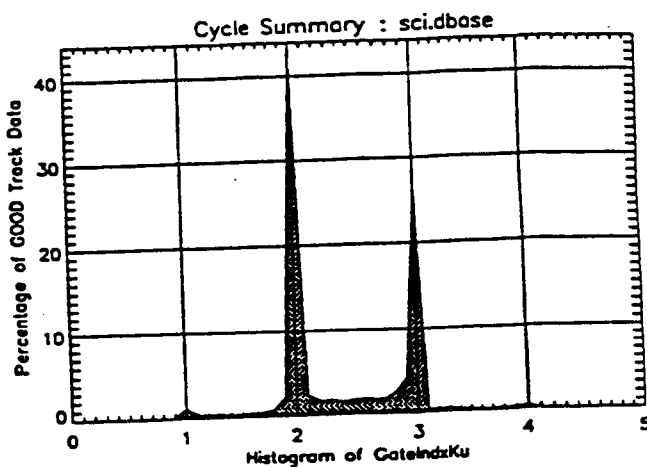
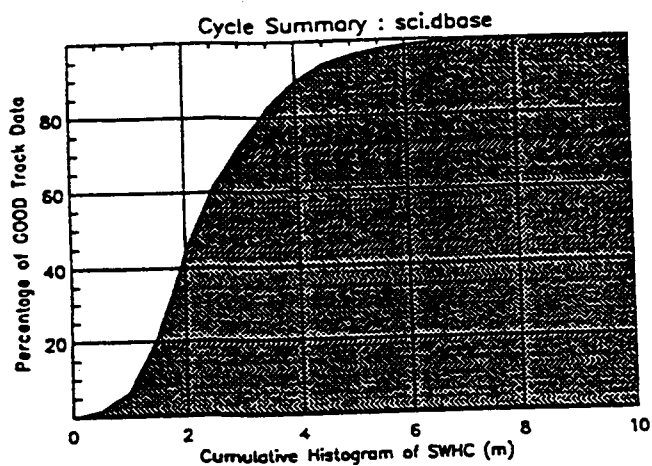
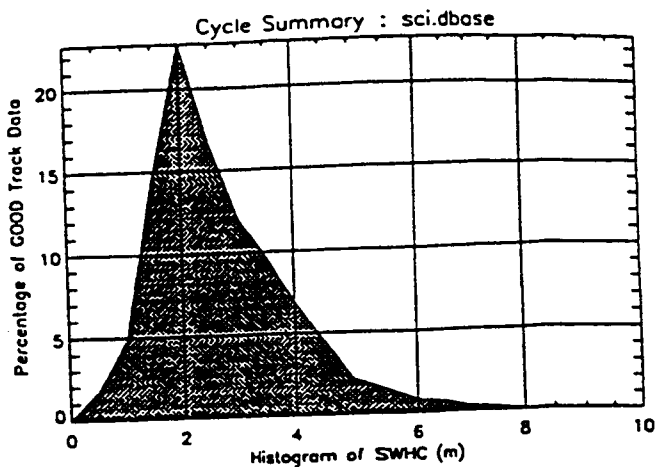
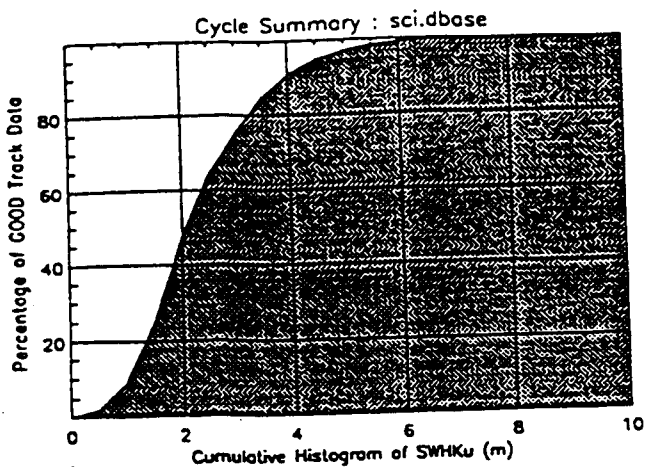












Attachment D: Software Under Change Control

FORTTRAN source code

1. topex time.lib
2. topex telem.lib
3. topex sdr.lib
4. topex general.lib
5. dosdr

Datafiles

1. DataFile.ROMMap
2. DataFile.EALimits
3. DataFile.CMD
4. DataFile.SensorDriver
5. DataFile.TelemDriver

IDL code

1. topexdbsci.pro
2. topexsdr.pro
3. topexeng.pro
4. topexcal.pro

Abbreviations & Acronyms

AIF	Altimeter Instrument File
ADP	Algorithm Development Plan
ADT	Algorithm Development Team
AGC	Automatic Gain Control
APL	Applied Physics Laboratory
CAL	Calibration Mode or Calibration Mode data
CSC	Computer Sciences Corporation
CNES	Centre National d'Etudes Spatiales
COTS	Commercial Off-The-Shelf
EM	Electromagnetic
ENG	Engineering Data
EU	Engineering Unit
FTP	File Transfer Protocol
GDR	Geophysical Data Record
GSFC	Goddard Space Flight Center
HDR	Header data
IGDR	Intermediate Geophysical Data Record
IDL	Interactive Data Language
JPL	Jet Propulsion Laboratory
NASA	National Aeronautics and Space Administration
NSI	NASA Science Internet
RASE	Radar Altimeter System Evaluator
SCI	Science Data
SDR	Sensor Data Record
SDS	Science Data System
SIS	Software Interface Specification
SDT	Science Definition Team
SEU	Single Event Upset
STR	Selected Telemetry Record

SWDT Software Development Team

SWH Significant Wave Height

TGS TOPEX Ground System (TGSA, TGSB, & TGSC VAX Cluster)

TMR TOPEX Microwave Radiometer

TOPEX Ocean Topography Experiment

UTC Universal Time Coordinated

WFF Wallops Flight Facility

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